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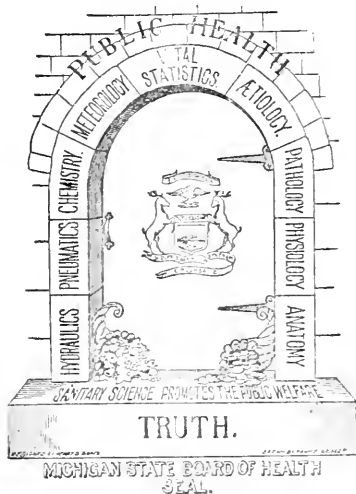
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TWENTY-FIFTH ANNUAL REPORT
OF THE
SECRETARY
OF THE
STATE BOARD OF HEALTH
OF THE
STATE OF MICHIGAN
FOR THE
FISCAL YEAR ENDING JUNE 30, 1897.



BY AUTHORITY

RESOLUTION OF THE BOARD RELATIVE TO PAPERS PUBLISHED IN
ITS ANNUAL REPORT.

Resolved, That no papers shall be published in the Annual Report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who shall be entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein.

Office of the Secretary of the State Board of Health,)
LANSING, MICHIGAN, *February, 1898.*)

TO HON. HAZEN S. PINGREE, *Governor of Michigan:*

SIR:—In compliance with the laws of this State, I present to you the accompanying Report for the fiscal year ending June 30, 1897.

Very respectfully,

HENRY B. BAKER,
Secretary of the State Board of Health.

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REPORT.

PART I.

This is the Twenty-Fifth Annual Report of the Secretary of the Michigan State Board of Health, and is for the fiscal year ending June 30, 1897. It is arranged in two parts. The first part contains the Secretary's report of the work of the Board, including the programs of sanitary conventions, reports of examination of plans and specifications of new State buildings, and minutes of regular and special meetings; a report of the work of the office, and brief statements relating to special subjects brought to the attention of the Board; then follows the Secretary's annual report of property, including accessions to the library, with names of donors, and financial statements for the calendar and for the fiscal year; after which will be found the following papers: "Treatment of the Drowned, Suffocated and Electrically Shocked", by Henry B. Baker, M. D.; "Teaching Sanitary Science in the Schools", by Prof. Delos Fall; "Suggestions on Public Health Work in Michigan", by Hon. Frank Wells; "Disinfection of Rooms", by Prof. F. G. Novy, M. D. and H. H. Waite, A. B.; and "Scarlet Fever has been Greatly Lessened by the People acting on the Advice of the State Board of Health. Should not that Advice be more Generally Accepted and Acted Upon?", by Henry B. Baker, M. D.

The second part contains papers, abstracts and reports, including one on the "Principal Meteorological Conditions in Michigan in 1896", one on "The Time of Greatest Prevalence of each Disease", being a Study of the Causes of Sickness in Michigan, especially in 1896, one on the "Communicable Diseases in Michigan in 1896"—relating to Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-Cough, Pneumonia, Consumption, Small-pox, Chicken-pox, R  theln, Mumps, Barber's Itch, Puerperal Fever, Glanders, Hog Cholera, Tuberculosis in Cattle, Lump-jaw, Cow-pox, Meat suspected of being Diseased, Soap suspected of being Poisonous, Peach Yellows, Polluted Water, Violations of Public-Health Laws, one on "Injuries and Losses of Life and Property from the Use of Kerosene", one on "Injuries and Loss of Life from the Use of Gasoline", and one on "Alleged Nuisances in Michigan in 1896."

Some of these reports include the extensive and valuable statistics on the subjects of sickness, meteorological conditions, etc., collected at the office of the State Board of Health.

Under the law, the Secretary of the Board is required to disseminate information "through an annual report and otherwise"; and, by direction of the Board, he issues immediately after the close of each week, a bulletin which shows the sickness during the week just passed; also a monthly bulletin; and sometimes publishes quarterly bulletins containing the proceedings of the Board and reports of the work of the office of the Board, and of the condition of health in Michigan during the quarter. The proceedings of sanitary conventions are published as soon as practicable after the occurrence of each convention. The office disseminates information by means of the telegraph, the telephone, by letter, and especially by means of hektographed statements prepared and distributed to members of the Board and others interested in public-health work, and to newspapers in Michigan. Thus items of sanitary interest in Michigan which are regarded as useful "news" are published at once in the comparatively ephemeral bulletins, etc., while the Annual Report is issued, not as a newspaper or journal is, as an ephemeral publication, but as a permanent official record of the work of the State Board of Health, and in the office of the Board, and of the local boards of health throughout the State. The annual report contains also statistics which require a great deal of painstaking care in their preparation, and which it is hoped will be useful, for all time to come, to those who study the causation of diseases; and through their labors, to the people of the State and country; and the statistics are there preserved in a permanent form, accessible, for purposes of study, to a comparatively large number of persons.

Law for distribution of Annual Reports needs amending.

Only about six thousand copies of the Annual Report are printed, to supply the two millions and more inhabitants of Michigan; and only 3,500 of those copies are at the disposal of the State Board of Health. Most of the other copies are distributed in the same manner as the "Joint Documents" are; and it is believed are largely wasted, because of the extremely bad plan of distribution—by sending them in bulk to the county clerks, from whom it is frequently more difficult to obtain them than it would be from the Capitol at Lansing. The entire number of copies printed should be distributed from the Capitol directly to those who are to receive them. Good use is made of the few copies now entrusted to the State Board of Health; some are sent to libraries, some are sent in exchange for the publications of other State Boards of Health, of prominent city boards of health, sanitary journals, authors of sanitary monographs, etc., others are sent to persons likely to make good use of them, including each of the fifteen hundred health officers in Michigan.

Names and addresses of members of the Board.

The names and postoffice addresses of the members of the Board, and the dates of the expiration of their terms of office, are as follows:

MASON W. GRAY, M. D., Pontiac, July 1, 1897.* FRED R. BELKNAP, M. D., Niles, Jan. 31, 1903.

* Although Dr. Gray was appointed to serve until July, 1897, the law says that the term of office shall expire January 31; and he expressed his willingness to retire as soon thereafter as his successor was appointed and qualified. Dr. Belknap qualified April 28, 1897, after which time Dr. Belknap served.

HON. FRANK WELLS, *President of the Board*, Lansing, July 1, 1897, Jan. 31, 1903.

SAMUEL G. MILNER, M. D., Grand Rapids, Jan. 31, 1899.

GEORGE H. GRANGER, M. D., Bay City, Jan. 31, 1899.*

DELOS FALL, M. S., Albion, Jan. 31, 1901.

HON. AARON V. MCALVAY, Manistee, Jan. 31, 1901.

HENRY B. BAKER, M. D., *Secretary of the Board*, Lansing.

The members of the State Board of Health, with the exception of the Secretary, are appointed for the term of six years, and receive no salary or *per diem* compensation for their services.

STANDING COMMITTEES.†

1. Epidemic, Endemic and communicable diseases.—George H. Granger, M. D.
2. Sewerage, and the disposal of excreta.—Mason W. Gray, M. D.
3. Water supply, including purification of sewage-contaminated water.—Prof. Delos Fall, M. S.
4. Buildings, including house drainage, ventilation, heating, etc.—Samuel G. Milner, M. D.
5. Climate, geology, topography and drainage.—Henry B. Baker, M. D.
6. Foods, drinks and their adulterations.—Prof. Delos Fall, M. S.
7. Poisons, explosives, etc.—Prof. Delos Fall, M. S.
8. School hygiene and sanitation.—Samuel G. Milner, M. D.
9. Sanitary inspections in cities and villages.—Hon. Aaron V. McAlvay.
10. Statistics of mortality and sickness.—Henry B. Baker, M. D.
11. Public health legislation.—Hon. Aaron V. McAlvay.
12. Finances of the Board.—Hon. Frank Wells.
13. Animals' diseases dangerous to man.—Mason W. Gray, M. D.
14. Relations of preventable sickness to taxation.—George H. Granger, M. D.
15. Quarantine at the Michigan border and within the State.—Hon. Frank Wells.

WORK OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1897.

Aside from the work in committees and in connection with the office of the Secretary of the Board, the work of the State Board of Health itself includes that done by means of sanitary conventions, the examination of plans and specifications for proposed public buildings, under Sec. 7, Act 206, laws of 1881. § 418. Howell's Statutes, amended by Act 86, laws of 1889, and work at regular and special meetings. These subjects are here considered in the same order as just mentioned; following which mention is made of the work of members of this Board at Farmers' Institutes.

* June 1, 1897, Doctor Granger resigned. Later Prof. F. G. Novy, of the University, Ann Arbor, was appointed to fill the vacancy.

† Committees as rearranged by President Wells and approved by the Board, Sept. 29, 1893; members as appointed by President Wells, July 12, 1895.

SANITARY CONVENTIONS.

Two successful sanitary conventions were held during the fiscal year ending June 30, 1897, as follows:—

Before the small appropriation act, No. 142, laws of 1897, took effect, the Board had expended a considerable portion of its appropriation for sanitary conventions, etc., in endeavoring to comply with the provisions of Act 146, laws of 1895, which requires the State Board of Health to send instructions to all teachers in Michigan. By so doing, other work necessarily suffered, and especially that work in connection with Sanitary Conventions. However, the Third Annual Conference of Michigan Health Officers, and the Hanover Sanitary Convention were held during the fiscal year ending June 30, 1897, as follows:—

THIRD ANNUAL CONFERENCE OF MICHIGAN HEALTH OFFICERS, JULY 16 AND 17, 1896.

At the Third Annual Conference of Michigan Health Officers, held at the State Laboratory of Hygiene, Ann Arbor, July 16 and 17, 1896, the following program was carried out:—

Statement of the Objects of the Conference. By Hon. Frank Wells, President of the State Board of Health, Lansing.

Toxins and Antitoxins. By Prof. Frederick G. Novy, Sc. D., M. D., Ann Arbor.

Discussion of the subject.

Bacterial Poisons in Milk and Milk Products. By Prof. V. C. Vaughan, Ph. D., M. D., Director of State Laboratory of Hygiene, Ann Arbor.

Discussion of the Subject.

Infantile Mortality, its Causes, and Suggestions for Lessening it. By Henry B. Baker, M. D., Secretary State Board of Health, Lansing.

Discussion of the subject. By Mason W. Gray, M. D., member of the State Board of Health, Pontiac.

Resolutions relative to improved laws for registration and returns of births and deaths.

System of Milk Inspection in the City of Detroit. By Samuel P. Duffield, M. D., Health Officer of Detroit.

Discussion of the subject, led by O. L. Dales, M. D., Health Officer of Grand Rapids.

Sterilization and Pasteurization of Milk. By Prof. Clinton D. Smith, Agricultural College, Michigan.

Discussion of the Subject, led by Hon. Frank Wells, President of State Board of Health, Lansing, and others.

The Duty of the State to Inspect Milk Supplies. By Hon. Aaron V. McAlvay, member of the State Board of Health, Manistee.

Discussion of the subject, led by Prof. Jerome C. Knowlton, Michigan University, Ann Arbor.

Organizations of Health Departments in Cities. By H. L. Rosenberry, Health Officer of Wausau, Wis.

The Cause of Diphtheria. By Frederick G. Novy, Sc. D., M. D., Ann Arbor.

Discussion of the subject, led by Prof. Delos Fall, member of State Board of Health, Albion, and others.

Bacteriological Diagnosis of Diphtheria and other Infectious Diseases. By A. W. Crane, M. D., Kalamazoo.

Discussion of the subject, by Doctor Hiram R. Mills, health officer of Port Huron.

The Preparation of Anti-Diphtheritic Serum. By Charles T. McClintock, M. D., Ann Arbor.

Results Obtained by the Use of Diphtheria Antitoxin. By John H. Kellogg, M. D., Battle Creek.

Discussion on Preceding Paper, and the Restriction of Diphtheria by Isolation and Disinfection.

By Henry B. Baker, M. D., and John H. Kellogg.

Resolutions, closing convention, etc.

HANOVER SANITARY CONVENTION, JUNE 3 AND 4, 1897.

At the Hanover Sanitary Convention the following program was carried out:—

- Address of Welcome, by Dr. F. O. Hudnutt, president of village.
 Response, and Statement of the Objects of the Convention, by Hon. Frank Wells, president State Board of Health, Lansing.
 The President's Address, by Dr. A. L. Ambrose, Hanover.
 The Farmer's Home and Its Surroundings, by J. W. Hutchins, Hanover.
 Discussion of the subject, by Prof. Delos Fall, member State Board of Health, Albion.
 Germs and their Relation to Disease, by Hon. Frank Wells, president of State Board of Health, Lansing.
 Discussion of the subject, by Prof. Delos Fall, member of State Board of Health, Albion.
 The Prevention of Tuberculosis (Consumption), by Dr. W. A. Fallas, Horton.
 Discussion of the subject, by Dr. Henry B. Baker, secretary of State Board of Health, Lansing.
 The Restriction and Prevention of Disease, from the Standpoint of a Clergyman, by Rev. O. H. Perry, Hanover.
 Discussion of the subject, by Dr. Fred R. Belknap, member of State Board of Health, Niles.
 Mother and Child—Their Sanitary Relations, by Dr. Bion Whelan, Hillsdale.
 School Sanitation, by Prof. F. J. Harrington, Hanover.
 Discussion of the subject, by Dr. Bion Whelan, Hillsdale.
 The Health Officer, his Duties and Powers, by L. B. Smith, Hanover.
 Discussion of the subject, by Dr. Henry B. Baker, secretary of State Board of Health, Lansing, and Dr. N. H. Williams, Jackson.
 Isolation and Disinfection, What, When and How?, by Dr. Walter C. Snyder, Horton.
 Discussion of the subject, by Dr. Fred R. Belknap, member of State Board of Health, Niles.
 Waste and Excreta, and Their Relation to Typhoid Fever, by Dr. N. H. Williams, Jackson.
 Resolutions, closing of the Convention, etc.

FARMERS' INSTITUTES.

Through the courtesy of the Officers in charge of the Farmers' Institutes, held under the auspices of the State Board of Agriculture, members of the State Board of Health have attended Farmers' Institutes held in various portions of the State, and talked to the people on subjects relating to good health, and the restriction and prevention of the dangerous communicable diseases. In this way the Board was able to supplement its work in connection with Sanitary Conventions. The opportunity has been a rare one and has enabled the Board to reach a class of people that is not largely represented at the Sanitary Conventions.

EXAMINATION OF PLANS FOR STATE BUILDINGS,—SEWER-AGE, VENTILATION AND HEATING,—DURING THE FISCAL YEAR ENDING JUNE 30, 1897.

Act No. 206, Laws of 1881 (§ 418 Howell's Annotated Statutes), as amended by Act No. 86, Laws of 1889, is as follows:

Plans for build-
ings, to whom
submitted.

14. SEC. 7. That before the board of any charitable, penal or reformatory institution shall determine on the plan of any building, or on any system of sewerage, ventilation, or heating, which has been authorized by the legislature to be constructed, such plan shall be submitted to the board of corrections and charities and the State board of health for examination and opinion thereon; and the board so submitting such plan shall, in its biennial report, show to what extent it was approved by the boards so examining them.

* * * That it shall be the duty of said State boards to visit said penal charitable and reformatory institutions, when necessary to make the examination herein required, and their official expenses necessarily incurred shall be audited by the Board of State Auditors and paid from the general fund—§ 418.

The following are reports concerning plans for public buildings, submitted to the State Board of Health for examination, during the fiscal year 1897:—

EXAMINATION OF PLANS AND SPECIFICATIONS FOR PROPOSED NEW WARD M, ASYLUM
FOR THE INSANE, KALAMAZOO, MICH.

[1683.]

Proposed use of the building.

A letter dated Kalamazoo, Mich., May 23, 1896, from Wm. M. Edwards, Medical Supt. of the Asylum, says: "1st. We expect to utilize this new building for one hundred (100) male patients who will be most largely of the demented, paralyzed, feeble and helpless classes. 2nd. It is located 130 ft. from our present male department, to the south and a little to the west, in open space. The plan is to heat from the steam conveyed from our central boiler plant."

At a special meeting of the State Board of Health at Ann Arbor, July 16 and 17, 1896, called in accordance with Act 206 of 1881, as amended by Act 86 of 1889, for the purpose of examining plans for a proposed new building—"Ward M" at the Michigan Asylum for the Insane, the specifications and plans were examined, and suggestions and recommendations were made as follows:—

Specifications.

On page 38 it is specified that "Connections between soil and waste pipes and vitrified sewer pipes to be made by turning the cast iron pipe (with an elbow) into the vitrified pipe and making joining with Portland cement," etc., and on page 39 it is specified that "All sewers inside the building without exception and extending three feet (3 ft.) outside of wall, will be six inch (6 in.) cast iron, same as specified for soil pipe." It is therefore impracticable to make the connection between the iron and vitrified pipes *with an elbow* as specified on page 38. The soil and waste pipes would be connected to the horizontal *iron* sewer in the basement by properly caulked lead joints and the connection between this iron sewer and the vitrified pipes should be made by a *straight* joint outside the building at a proper distance from the foundation walls.

Page 40.—"All soil and waste pipes, from one length below roof to top, shall be increased to two inches (2 in.) in size in all cases." If carried out as specified, it would make the diameter of the upper terminal ends of the soil pipes only two inches, and if the single word "to" is changed to "by" they would be 6, 7 and 8 inches respectively. The specifications seem to be wrong; should it not read all *waste* pipes to be increased *by* two inches in size?

Page 46.—"Bell" traps are specified to be fixed in bath rooms, water closet rooms and mop rooms, of first and second floors. These traps should not be used *in any part of the building*, as they would be a constant source of danger to the inmates. They are universally condemned by sanitarians and are practically obsolete. Proper S or P traps, with deep seal, should be used instead of the "Bell" traps.

Page 48.—“The sewer inside of building will be of cast iron, and will extend three feet (3 ft.) outside of wall, except one downspout run which will be of tile, running through east wing.” This is a part of and has direct connection with the sewerage system, and therefore should be treated in the same manner as though the soil and waste pipes were connected to it. *It should be of iron where it passes under the east wing, and extending outside 5 or 6 feet on each side of the walls of the building.*

The plans contemplate the ventilation of the sewer through each of the rain conductors. This arrangement is disapproved, as the foul air from the sewer would be delivered below the roof in the vicinity of windows. Unless a better plan is adopted, each rain conductor should have a trap (with deep seal) at its base, and be provided with a catch-pit; but a better plan would be to provide a separate set of pipes from the rain conductors, and make all converge to *one* catch-pit, and have *one* connection between them and the sewer through a trap, with a shaft brought to the surface and open at the top for the admission of fresh air, the opening being protected by a hood or grating. This trap should not be placed beyond,—on the main-sewer side of—the running trap of the sewer.

Page 48.—“Contractor to provide a running trap and vent on the eight-inch (8 in.) pipe, with six-inch (6 in.) connection carried to the surface of ground, and capped with cast iron hooded cap.” The position of this trap is not shown on plan; it should be placed at a point beyond,—on the main sewer side of the connection of the branch sewer from the catch-basin, or grease interceptor, with the eight-inch sewer.

Page 49.—“Catch-basin” and “Blow-off” basin are to be provided and connected with sewer, etc. The method of trapping these basins is not clearly shown or described. It is presumed that the partition shown in the catch-basin on the “Foundation” plan is to form the trap, and the top of the manhole covered with one movable cover. This would leave the *sewer* side of the partition open to the sewer, and permit air to pass from the sewer when the cover was raised. A better (and cheaper) method would be to form the outlet of the catch-basin by a stoneware elbow placed opposite to the inlet and turned down into the basin near to the wall. This would prevent grease and solid matters from passing into the sewer and would also effectually trap the catch-basin from the sewer.

Page 57.—“The system contemplates heating the entire building by the blast system, with blower in the basement, the air circulated through ducts on basement ceiling, with registers in floors and walls, and vent connections through basement and attic space, connected with vent shafts as indicated on drawings.” The system of heating by blast system is not approved; also the provision for circulating the air through registers in floors is not approved, but, instead, the specification on page 64 relating to the placing of hot-air registers should read: “*All* hot-air registers will be placed as indicated, and will be set in the walls so that their lowest point will be at least eight feet (8 ft.) from floor.”

Page 64.—“Vent openings will have white japanned register faces, and will be set immediately above the base.” This is not approved; the vent openings should be *through the base, extending down to the floor level.*

All foul-air registers, where practicable, should be placed under or near the windows, and be connected to the vertical shafts by air-tight flues or tubes passing under the floors between the joists.

Plans.

By reference to the second floor plan it will be seen that the vents from the "Patients' Toilet Room", "Attendants' Toilet Room", "Day Room" and "Mop Room" apparently open *directly* into the main vertical foul-air shaft. This arrangement would, under certain conditions, deliver foul air into the rooms instead of removing it.

The single vent shaft, shown on plans, for the entire building is disapproved. There should be a *separate* vent shaft from each room to the outer air above the roof. One method of terminating the foul-air flues is suggested in the closing paragraphs from the report of the examination of plans and specifications for a Cottage Dormitory at the U. P. Hospital for the Insane at Newberry, Mich., as follows:—

"The foul-air shafts are planned to terminate, in a single line, not in a group, immediately under the ridge of the roof, the openings at the sides of the ridge being protected by louvres. The construction is such that it is claimed that air-pressure from either side will accelerate the upward movement of air in the foul-air shafts.

"This method of terminating the foul-air shafts at the roof is commended to those architects and others who have not heretofore seen a good way to have numerous foul-air shafts open separately at or above the roof."

The foregoing report is respectfully submitted.

HENRY B. BAKER,
Secretary.

Office of the Secretary of the
MICHIGAN STATE BOARD OF HEALTH, }
Lansing, July 21, 1896.

PROPOSED COTTAGE AT THE HOME FOR THE FEEBLE MINDED, LAPEER, MICH.

(1729.)

The State Board of Health held a special meeting at Lansing, Dec. 3, 1896, for the examination of the plans for a proposed "Cottage" at the Home for the Feeble Minded, at Lapeer.

A letter from Dr. Polglase, Superintendent, states that "the building is designed to accommodate not more than 75." "The basement will be used for the fan and coils, it being intended to use the blower system" of ventilation.

The building is planned to be only two stories in height.—Considering the character of the inmates and the purpose for which the building is to be constructed, this is cordially approved.

The specifications provide that "Traps to be ventilated with galv. iron 2 in. pipes running through the roof as specified hereafter."—Galvanized-sheet-iron pipes are not safe for this purpose; they should be of iron with properly-caulked lead joints.

It is also provided that there shall be two running ventilated traps for soil pipes in the basement with air inlet for both opening under verandah.—This appears to be objectionable.

The arrangement of the rain-water drains and sewers, as shown on the basement plan, is not approved. The catch-basin should be placed *outside* the building, and at a point near to where the iron sewer is shown to be connected to the stoneware pipes; and the rain-water and subsoil drains conveyed to the same *on the outside of the building*. This would

prevent flooding of the basement by reason of stoppage, or defects in the drains, and would dispense with the large unventilated sewer, flap-trap, catch-basin, etc., inside the building, which would be objectionable. A six-inch iron sewer, with four-inch branches, and properly-caulked lead joints, should then be run to the soil and waste pipes in the basement, the iron pipes extending outside the building to a distance of at least six feet. The remainder of this sewer may be of stoneware pipes with cement joints. The six-inch pipes should be connected to the eight-inch sewer through a self-cleansing trap, six inches in diameter, with a shaft carried from the top of the trap to the surface of the ground, for access, and also for inlet ventilation. The air inlet should be continued a sufficient distance above the surface to prevent the entrance being closed during heavy snow, and the top turned over or protected by a cap or hood. The catch-basin should be connected to the six-inch sewer, at some point between the main-trap and the building, by turning the outlet from the catch-basin with a bend or elbow, down into the catch-basin to a sufficient distance. This will effectually trap the basin, and also prevent the passage of some solid matters from the basin to the sewer.

The specifications state that minor vent pipes may be connected together in the attic and run as one pipe out of the roof.—Each separate soil or waste pipe should be carried independently to and above the roof, but the vent pipes from the traps on each stack may be connected back into the stack before it passes through the roof, and above the highest fixture, but the vent pipes of one stack should not be connected to the vent pipes of another stack.

The specifications ask for bids on the Blast system of heating and ventilation, with provision for the supply of warm air, also for the supply of both warm and cold air. The air supply is to be taken from above the roof and carried to the basement through a large brick flue near the southwest corner of the building.—This is not approved, because when the fan is not in use it will sometimes be impossible to obtain a supply of fresh air. Provision should be made for taking in fresh air from a source from which it would be available when the fan is not in motion.

The fresh air is planned to be delivered into the rooms at about seven feet from the floor level, and the foul air to be removed at the floor level, the foul-air registers, in nearly every case, being placed near to the windows.—These specifications are approved, in so far as the position of the registers is concerned.

The foul air is planned to be carried from the first and second floors down to the basement, through galvanized flues built in the walls, these being connected to horizontal flues made of flooring and lined inside with Ruberoid roofing, and suspended from the ceiling of the basement. All the vent pipes in the basement are planned to be connected to one large flue which runs vertically to the roof. No provision seems to have been made for accelerating the draft in this flue when the fan is not in motion. In fact, breathing of fresh air must stop whenever the fan stops. Open fireplaces are planned to be provided for the sitting rooms of the first and second floors. This provides for direct outlet ventilation in these two rooms; but the source of the supply of fresh air when the fan is not in motion is not certain. Either the air must come down the shaft from the roof, through the fan, and through the coils of pipes, or it must come from the foul-air shafts by way of the basement.

The attempt to ventilate a building by having foul-air shafts or flues from the first and second floors to take the foul air to the basement is not approved. The vents should go up and out.

The attempt to ventilate a building by carrying the foul air from several rooms to one common receptacle is not approved. All the foul-air flues should run each independently to the outer air, and be placed in inside walls.

The sizes of several of the fresh and foul-air flues shown on the plans are entirely inadequate to the work they would have to perform when the fan is not in motion. They are therefore not approved. All the flues, vents and registers should be made of such a size that when the fan is not in motion the proper quantity of air will pass into and out of the rooms when moving at such a rate as it would move when the difference in temperature between the outer and indoor air is not great. Provision should be made for supplying at least 2,000 cubic feet of fresh air for each occupant per hour *at all times*, in every occupied room.

With the above-mentioned exceptions, the plans and specifications are approved, so far as this Board is required by law to examine and express an opinion.

Official.

HENRY B. BAKER,
Secretary.

Office of the Secretary of the
MICHIGAN STATE BOARD OF HEALTH, }
Lansing, December 5, 1896.

EXAMINATION OF PLANS AND SPECIFICATIONS FOR A PROPOSED NEW COTTAGE BUILDING FOR MEN; ALSO PLANS* FOR A PROPOSED KITCHEN-AND-DINING-ROOM BUILDING; ALSO PLANS AND SPECIFICATIONS FOR THE HEATING AND VENTILATING OF BOTH BUILDINGS, AT THE UPPER PENINSULAR HOSPITAL FOR THE INSANE, NEWBERRY, MICH. (1892.)

At a special meeting of the State Board of Health, held at Hanover, Michigan, June 3, 1897, the plans and specifications for a proposed new cottage, plans for a proposed kitchen-and-dining-room building, and plans and specifications for the heating and ventilating of both buildings, were examined in accordance with Act No. 206, Laws of 1881 (§ 418, Howell's Statutes) as amended by Act No. 86, Laws of 1889.

C. T. Fairbairn, Trustee of the U. P. Hospital for the Insane, and the architect, D. F. Charlton of Marquette, were present to explain the plans and specifications.

The system contemplates the heating and ventilating of these buildings by a fan and coils, and also by a certain amount of direct radiation. The fan and engine are to be located in the kitchen-and-dining-room building, and to be so arranged, by the aid of adjustable dampers or valves, that either this building or the cottage building can be furnished with its maximum amount of air, or that both may receive a portion, or the whole of it, if required, by increasing the revolutions of the fan. The distance between the two buildings is approximately fifty (50) feet, and an underground tunnel connects them.

Each heater jacket is to have a swing door of 25% greater area than the inlet of the fan, to allow for the natural circulation of air through heaters when the fan is used for the other building.

* No specifications submitted.

The source of the fresh-air supply to the heaters is not indicated except by a door, in cottage basement, which communicates with the heater, by which it is apparently intended to use the air of basement rooms for this purpose; but it was stated by architect Charlton that the fresh-air supply was to be by a conduit from the tunnel under the cloister. It is recommended that the air supply be from the outer air through an air-tight conduit.

The air from the fan to the cottage building is to be carried through a 30in. galvanized round pipe, placed in the tunnel above mentioned. All other ducts to be of the same material, of sizes shown on the plans.

The temperature of the rooms on the first and second floors of the cottage building is to be regulated by the Johnson system of temperature regulation.

The vents in the dining rooms, in the kitchen-and-dining-room building, also the vents in the cottage, are placed on inside walls. It would be better if the registers communicating with these vents were placed under the windows wherever practicable, and communicate with the flues on the inside walls by tubes or conduits placed between the joists.

The height of the inlet and outlet registers from the floor is not shown, but the architect stated that the inlets are to be at the ceiling and the outlets, in the walls, at the floor level.

The method of connecting the vent flues with the ventilator on the roof is not shown or described, but was stated by the architect to be by using the attic as a common foul-air chamber, the foul air escaping from thence to the outer air through louvres in the roof ventilator, which communicates with the attic.

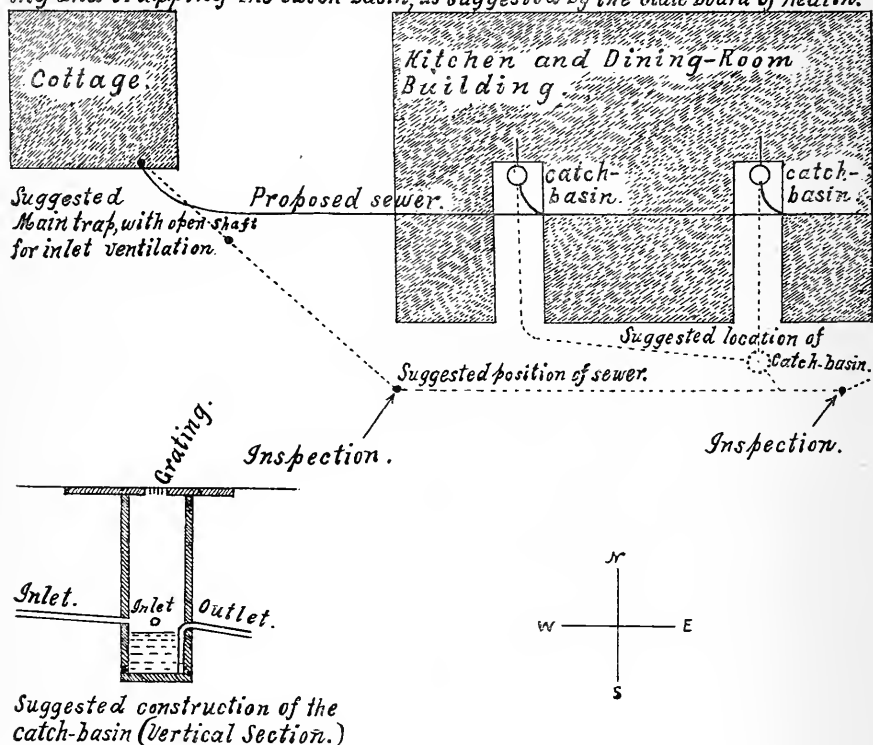
The method of discharging the foul-air from all the rooms into the attic is not approved. Each foul-air shaft should be carried independently to the outer air. It is particularly important that the toilet rooms of both buildings be ventilated, and that the foul-air be carried by *separate* shafts to the outer air, the registers being placed in the walls at the floor level. The top of such shafts should be protected against down-draught by a "Star", or "Globe", or other suitable ventilator.

The blast system of heating and ventilating is considered to be as yet in the experimental stage, and very complicated, especially where a system of temperature regulation is adopted; it requires skilled help to operate and maintain the same in good working order. But the most important objection to this system is that there is no certainty that the fan will always be in motion, and when the fan is not in motion, the flow of air through the ducts—which are usually of smaller area than would be necessary in a system of "natural" ventilation—would be insufficient to maintain the air of the rooms in a sufficiently pure condition. For these reasons, the system of ventilation and heating proposed for these two buildings is not approved.

The sewage from the water closets, etc., of the kitchen-and-dining-room building, is planned to discharge into two circular brick catch-basins, before it enters the six-inch sewer. These should be tightly covered, being under and in close proximity to windows. It would, however be safer to place them at such a distance from the building as would prevent foul air from same entering the building when they are being cleaned out, and if the main sewer is laid outside the building, as recom-

mended in the following paragraph, one catch-basin will be sufficient. The method of trapping the same is shown in the accompanying sketch.

Diagram.—Location of sewer and catch-basins for Cottage, and for Kitchen and Dining-Room buildings, U. P. Hospital for Insane, Newberry, Mich., as shown on the plans submitted to the State Board of Health, and as suggested by the State Board of Health, the suggestions being indicated by dotted lines. Also, the method of constructing and trapping the catch-basin, as suggested by the State Board of Health.



[PLATE 925]

A portion of the sewer which passes under this building is colored blue on the plans, and indicated to be of iron; while that portion which passes under the dining rooms is colored red, and is evidently intended to be of stoneware. Every portion of the sewer which is to be under any part of the building, should be of iron, and extend at least 5 feet beyond the outside walls. It is recommended, however, that the main sewer do not pass under any portion of the kitchen-and-dining-room building, but that it be laid outside the building, at least six feet distant from the outside wall; as shown in the accompanying sketch.

It is not shown on the plans of the kitchen-and-dining-room building whether the soil and waste pipes of this building are to be carried above the roof for ventilation. This should be carried out in the same manner as described in the specifications for the cottage, in which the soil pipe

is to be carried to a point one foot above the roof, and enlarged, from four to eight inches in diameter, where it passes through the roof, to avoid its being closed by frost, and the waste pipes properly ventilated into separate 2 in. cast iron vent pipes, to be carried up into attic and there connected to 4 in. cast iron pipe and extended to two feet above the highest point of the roof.

There is no provision made for the disconnection of the soil and waste pipes of either building from the main sewer. It is therefore recommended that the soil and waste pipes of each building be connected to the main sewer through a suitable main trap, provided with a shaft to be carried to or above the surface of the ground, for the purposes of inspection and ventilation, as indicated in accompanying sketch,—Plate 925.

With the above-mentioned exceptions, the plans and specifications were approved, so far as this Board is required by law to examine and express an opinion.

HENRY B. BAKER,
Secretary.

Office of the Secretary of the
STATE BOARD OF HEALTH, LANSING, MICH., }
June 30, 1897.

REGULAR AND SPECIAL MEETINGS OF THE STATE BOARD OF HEALTH, DURING THE FISCAL YEAR ENDING JUNE 30, 1897.

REGULAR MEETING, JULY 10, 1896.

[It was found impracticable to hold the regular meeting. No quorum was present.]

SPECIAL MEETING, JULY 16 AND 17, 1896.

Proceedings of the State Board of Health at a special meeting at Ann Arbor, Mich., July 16 and 17, 1896.

The call for this meeting was as follows:—

STATE BOARD OF HEALTH.
MICHIGAN.
OFFICE OF THE SECRETARY.
Lansing, July 11, 1896. (1881.)

Member of State Board of Health,

DEAR SIR:—

A special meeting of the State Board of Health is hereby called to meet at the "Cook House" in Ann Arbor, for the purpose of examining the plans and specifications for a proposed new building ("Ward M") at the Michigan Asylum for the Insane at Kalamazoo.

The special meeting will be called to order at 1:00 P. M., July 16, 1896.

Very respectfully,
FRANK WELLS,
President.

The meeting was called to order at 1 P. M. The members present were: Hon. Frank Wells, president, Prof. Delos Fall, Hon. A. V. McAlvay, and Henry B. Baker, Sec.

The Secretary said that the plans had been sent by express, and that instead of delivering them where they were addressed—the Cook House,

the express messenger had taken them elsewhere, and he was unable just then to obtain the plans.

On motion, the Board adjourned to meet again at 6 P. M. of the same day.

At 6 P. M. the Board was called to order by the president. The same members were present as at 1 P. M. The plans and specifications were present.

Secretary Baker said that in preparation for this meeting he had had Mr. Ainge, of the office at Lansing, go carefully over the plans and specifications, making notes of whatever seemed to need attention; that he, the Secretary, had himself examined the plans and specifications, using the notes prepared by Mr. Ainge; that he had at this meeting such amended notes which he would lay before the members in the order in which the subjects occurred in the specifications.

The Board proceeded to examine the plans and specifications.

Soon after the examination began, Mason W. Gray, M. D., came in and took his place as a member of the Board.

The notes presented by the Secretary were severally examined in their order, amended in one particular, and, pending a motion that the amended notes serve as the basis of the Secretary's official report of the examination, it was suggested that further time be taken on one or two questions, and on motion the Board adjourned the further consideration of the plans until the following day.

July 17 at 1 P. M. the Board was called to order by the President. The members present were: Hon. Frank Wells, president; Mason W. Gray, M. D., Prof. Delos Fall, Hon. A. V. McAlvay, and Henry B. Baker, Sec.

On motion, the Secretary was directed to report to the Board of Trustees of the Michigan Asylum for the Insane the results of the examination, using the amended notes as approved by the Board, as the substance of the report, as follows: (The report was hektographed, sent to the Medical Superintendent of the Asylum, to each member of the Board of Trustees of the Michigan Asylum, and to each member of the State Board of Health. It is printed in this Annual Report of this Board, under the heading: "Examination of Plans," etc., page xiv.)

On motion the Board adjourned.

SPECIAL MEETING AT ANN ARBOR, JULY 16 AND 17, 1896.

The call for this meeting was as follows:—

STATE BOARD OF HEALTH.
MICHIGAN.
OFFICE OF THE SECRETARY.
Lansing, July 9, 1896.

Member of State Board of Health,

DEAR SIR:—

A special meeting of the State Board of Health is hereby called to meet in Ann Arbor during the intervals between the sessions of the Conference, for the purpose of examining the plans and specifications for a proposed new building at the Michigan Asylum for the Insane at Kalamazoo, and for the transaction of such other business as may properly come before the Board.

This special meeting will be called to order at 6:00 P. M., July 16, 1896.

Very respectfully,

FRANK WELLS,
President.

The meeting was called to order at 6 P. M. The examination of plans not having been accomplished at 1 P. M., at the special meeting for that purpose, that subject was taken up, as recorded in the proceedings of that meeting.

The regular business of the Board was postponed to an adjourned meeting to be held at 9:30 P. M. of the same day.

At 9:30 P. M. the Board was called to order by the President. The members present were: Hon. Frank Wells, President, Prof. Delos Fall, Hon. A. V. McAlvay, Mason W. Gray, M. D., and Henry B. Baker, Secretary.

State Board of Health vouchers Nos. 2690 to 2696 inclusive were audited and allowed.

The Secretary presented the question whether Mr. Roberts P. Hudson should be placed on the pay roll as a "regular" instead of an "extra" clerk. On motion, it was voted that the change be made by the Secretary.

The Secretary read a proposition, as follows:—

Should there not be prepared a statement relative to the work of the Board, from its organization, and especially during the last two years; a statement of the needs of the public-health service; a statement of the bills which in the judgment of this Board should be enacted into laws? These statements to be presented to the Board at its next meeting (Oct.), be placed before the incoming Governor as soon as elected, with a view of recognition in his message to the Legislature. Should it not in part or in whole be published in the proceedings of the meeting of this Board in January, 1897?

On motion of Dr. Baker, Prof. Delos Fall and Judge McAlvay were appointed a special committee to prepare the statements outlined in the foregoing proposition made by the Secretary.

The subject of the finances of the Board was presented by the Secretary, who stated what, after paying the salary of the Secretary, the available balance would be for the remaining six months of this year.

Prof. Fall said that he had an intimation from Hon. Washington Gardner, Secretary of State, that if a committee of this Board put the case before the Board of State Auditors, it was possible the bill for expenditures by this Board in complying with Act 146, Laws of 1895, for which no appropriation was made, would yet be allowed.

Secretary Baker said that he had ceased to wish that the bill be allowed; that having sent to the newspapers and correspondents of the Board notice that the Board of Auditors had refused to allow the bill, and several persons having already sent in postage stamps for the sending to them of the Annual Report, it would be impossible to explain the subject to all interested if the Auditors should now allow the bill; and he thought the subject was in better form to place before the Legislature if the Auditors did not allow the bill. He thought the public health interests would, in the end, be better subserved if the Auditors do not allow the bill.

It was explained by Prof. Fall that, if allowed, it would be only as a temporary measure which should not be a precedent for the allowance of a similar bill for a succeeding year.

On motion of Prof. Fall, the President was directed to appoint a committee of which President Wells is to be chairman, to go before the Board of State Auditors to ask that the bill be allowed. The President

appointed Prof. Fall and Judge McAlvay to be members of the committee.

The Secretary presented his quarterly report of work in the office; it was ordered placed on file. [It is printed on pages lxxxvii-xcv of the Annual Report of this Board for 1896.]

The Secretary presented and read a letter from S. P. Duffield, M. D., Health Officer of Detroit, transmitting preamble and resolution of the Detroit Homeopathic Practitioners' Society relative to the spitting nuisance. It petitioned the Detroit Board of Health to "use its influence to secure the passage of an ordinance making the practice of spitting in public halls, street cars, steamboats, etc., a nuisance punishable by fine."

The subject was discussed. Secretary Baker said that he believed the New York City Board of Health had passed such a regulation; that it was alleged that it was not enforced, but that considerable good had resulted from calling attention to the nuisance. Several suggestions were made by members of the Board: that the Board of Health of Detroit might call attention to the subject, that the State Board might issue a circular on the subject, that the Legislature might make a general law tending to discourage the practice of the nuisance.

The Secretary presented a communication from H. F. Dunham, C. E., of New York, with a report of the relation of the water supply to the epidemic of typhoid fever in Menominee, Michigan, in April, 1896. The Secretary also presented a communication on the same subject from Hon. John F. Hicks, Health Officer of Menominee, being a copy of his report to the Common Council of Menominee.

On motion, the Secretary was authorized to prepare for publication in the Annual Report of this Board the best information available from any source as to the epidemic and its causes.

On motion, the Board adjourned subject to the call of the President at any time before the members leave Ann Arbor.

July 17 at 4:20 P. M., the Board was called to order by the President. The members present were: Hon. Frank Wells, President, Mason W. Gray, M. D., Prof. Delos Fall, Judge A. V. McAlvay, and Henry B. Baker, secretary.

On motion of Dr. Baker, it was voted that the Secretary be directed to publish, as soon as practicable, as a Supplement to the Annual Report of the State Board of Health, the proceedings of the Third Conference of Health Officers at Ann Arbor.

On motion the Board adjourned.

REGULAR MEETING AT LANSING, OCT. 9, 1896.

The meeting was called to order at 3:30 P. M., by President Wells, and the other members present were: Prof. Fall, Judge McAlvay, Doctor Gray, and Secretary Baker.

The minutes of the special meeting, at Lansing, April 10, 1896, were read by the secretary, and approved by the Board.

The minutes of the regular meeting, at Lansing, April 10, 1896, were read by the secretary, and approved by the Board.

The minutes of the two special meetings, at Ann Arbor, July 16 and 17, 1896, were read by the secretary, and approved by the Board.

State Board of Health vouchers numbers 2689 and 2705-2719, inclusive, were considered and allowed.

The secretary's report of work in the office during the past quarter was received and placed on file. [It is printed on subsequent pages of this Report.]

On motion of Prof. Fall, it was voted to print in the Annual Report of the Board, a paper on the "Etiology and Pathology of Typhoid Fever" and an "Appendix of Outbreaks of Typhoid Fever Traced to Milk as a Cause," the paper having been read by Doctor Baker before the meeting of the State Medical Society, at Mt. Clemens, June, 1896.*

On motion of Judge McAlvay, it was voted to print in the Annual Report Doctor Baker's paper "Relations of the Funeral Director to the Public Health," read before the State Association of Funeral Directors, at Kalamazoo, July 8, 1896.†

The secretary presented a letter he had received from Mr. James G. McHenry, relative to retaining his position as extra clerk in the office.

On motion of Judge McAlvay, the Board voted to continue Mr. McHenry as extra clerk.

Secretary Baker presented the subject of a Quarter-centennial of the establishment of this State Board of Health.

On motion of Judge McAlvay, the secretary was made a committee to report at the next meeting a plan for an appropriate celebration of the twenty-fifth anniversary of the establishment of this Board.

The secretary mentioned that during the quarter he had received from Washington a subscription list for a proposed monument to M. Pasteur, to be erected in Paris, France. It was thought that such a monument, in commemoration of the grand work done by Pasteur, would be very appropriate. The Board, however, had no power to subscribe.

Secretary Baker presented a circular, just received from the Provincial Board of Health of Quebec, which related to a rapid method for a serum-diagnosis of typhoid fever. The Quebec Board of Health has undertaken such a diagnosis. It seems that Pfeiffer of Berlin and Widal of Paris have proved that the serum obtained from the fresh or even the dried blood of a typhoid-fever patient is capable of so acting upon typhoid bacilli as to abolish the active motion so characteristic of those "germs" in fluid (bouillon) culture media, and to cause a gluing together of the individual bacilli into groups or clumps. This change is easily seen under the microscope, or in culture tubes, and occurs within a few minutes. For the purposes of testing the practical utility of the method, the Quebec Board offers to examine and report (free of charge) upon any samples of blood collected from suspected typhoid cases within its province. This method is very simple. A piece of sterilized paper is sent out, the physician is to prick the ear or finger of his patient, and collect on this paper a drop or two of blood, which is then sent to the bacteriological department of the Quebec Board, from which a report whether the case is typhoid will be sent within a few hours after receipt of the sample. When the test gives a negative result, it is not certain that the patient is not suffering with typhoid, and the test should be repeated each day for several days. If the result continues negative, it is very strongly probable that the disease is not typhoid. But when the result of the test is positive it is reasonably certain that the patient has typhoid

* This paper is printed on pages cxlii-clxxxv of the annual report of this Board for 1896.

† This paper is printed on pages clxxvi-cxci of the Annual report of this Board for 1896.

fever, and restrictive measures (and proper treatment) can at once be commenced. This test is known as the Widal test.

The secretary read a letter which he had received from Doctor A. W. Crane of Kalamazoo. The letter related especially to municipal bacteriological work.

On motion of Judge McAlvay the secretary was authorized to use his judgement with regard to the publication of the letter in the Proceedings of the Third Annual Conference of Health Officers, or elsewhere, where it is thought it will do the most good.

The special committee, consisting of Prof. Fall and Judge McAlvay, to prepare a statement relative to the work of the Board and the public-health legislation needed, reported progress.

The committee, consisting of the President and Prof. Fall, to go before the Board of State Auditors, reported that they appeared before that Board and endeavored to convince its members that the bill for expenses incurred under Act 146, laws of 1895, should be allowed. They said that the Board of State Auditors seemed to be favorably inclined; but after the meeting, it was learned that the Board decided that they were not the proper auditing officers and had no legal jurisdiction.

By request, Mr. K. L. Butterfield, editor of the "Grange Visitor" and director of the State "Farmers' Institutes" appeared before the Board.

Prof. Fall explained to Mr. Butterfield that the Board would be very glad to be represented on the programs for Farmers' Institutes.

Mr. Butterfield thought arrangements could be made whereby the Board could be represented, and the expenses of the representative paid from the Institute fund.

After considerable discussion, it was decided that further action in this connection be held in abeyance until Mr. Butterfield supplied the secretary with a list of the local committees for coming institutes; this would make it possible, in some instances, to select a person in the locality where the Institute is to be held, to represent the State Board of Health.

On motion of Judge McAlvay, the Board took a recess from 6:00 to 7:00 P. M.

Evening Session, at 7:15 P. M.

President Wells, Prof. Fall, Doctor Gray, Judge McAlvay, and Secretary Baker were present.

The secretary mentioned that Governor Rich had hesitated to approve Doctor Cattermole's last bill, for expenses incurred in investigating the outbreak of diphtheria at Niles. The Governor had instanced cases in other State Departments which he believed to be the same; but, upon investigation, the secretary had found that the incidents referred to were not similar. The Governor said he would ask the opinion of the Attorney General. Secretary Baker said that although it has long been the custom in the other State Departments to detail a clerk, or for the deputy or the chief official himself, to go about the State whenever the public service demand, there is no statute law for such action; therefore it is clearly improper to give such official or clerk compensation in excess of that authorized by the law under which the official or clerk is regularly employed. In the case of Doctor Cattermole, the circumstances are very different from any of those in other State Departments,

just mentioned. When he is appointed a Communicable-disease inspector, and sent by the State Board of Health to act under Act 47, laws of 1893, he ceases, for the time being, to be employed as a clerk under §339 Howell's Statutes. Therefore, as a clerk his compensation ceases, and for the time employed as Inspector under the "emergency law", his compensation cannot be governed by §339 Howell's Statutes, by Act 47, laws of 1893, under which he is a sworn officer.

Judge McAlvay thought the claim was legal and proper, and said that it was economy for the State to have an expert in the office whom the Board could send at a minute's notice, and at other times keep employed as a regular clerk. He thought that possibly the Board should appoint Doctor Cattermole as inspector each time he went on such an investigation, although it was possible that a single appointment as inspector might be sufficient.

On motion of Judge McAlvay, the Board voted to continue the authority conferred upon the president and secretary under Act 47, laws of 1893, to appoint inspectors when necessary, and to audit bills.

On motion of Prof. Fall the Board instructed the secretary to ask of the Attorney General an opinion on the legality of this Board employing an inspector under Act 47, laws of 1893; and, who may when not acting as such inspector, act as clerk in the office of the Board.

The secretary read four typewritten pages which he had prepared relative to public economy resulting from public-health work. He said that during the past quarter he had occupied his spare time in ascertaining the results of the health work which had been done in Michigan, more especially for the restriction of dangerous diseases. The statistics collected by the Secretary of State and those collected by the State Board of Health agreed in indicating that lives had been saved and sickness prevented which had resulted in saving to the people of Michigan over one million dollars per year. The outlay had been very small. The public-health work of the State had thus been very profitable. In recent years the work had been greatly hampered for lack of money to properly distribute about the State the information necessary for the people to have in order to make the restriction of diseases as effective as it would be if all the people could be taught to coöperate in the work; nevertheless the results had been very gratifying.

The Secretary presented the subject of a decline in the death-rate from scarlet fever in Chicago. He had thought the decline was probably due to the inauguration of restrictive measures. He said he was very much surprised when in reply to his question he received a telegram (dated Oct. 8) from the health commissioner of that city, stating that restrictive measures were in force in that city only with reference to less than five per cent of the cases "plus those enforced by the attending physician." He would investigate the subject still further.

On motion the Board adjourned at 8:30 p. m.

SPECIAL MEETING AT LANSING, DECEMBER 3, 1896.

This special meeting was called to meet for the purpose of the examination of the plans and specifications for a proposed new cottage at the Home for the Feeble Minded, at Lapeer, and for the transaction of such other business as might properly come before the Board.

The meeting was called to order at 10:30 a. m., by the president, Hon. Frank Wells, of Lansing; the other members of the Board present were: Prof. Delos Fall, of Albion; Dr. Samuel G. Milner, of Grand Rapids; and Secretary Henry B. Baker. (Dr. George H. Granger, of Bay City, came in and took his seat as member of the Board at 11:45 a. m.)

[The portion of the proceedings of this meeting relative to the examination of the plans for a new cottage at the Home for the Feeble Minded, will be found printed on preceding pages of this Report, in connection with the subject "Examination of Plans for Proposed New Public Buildings, Sewerage, Ventilation, or Heating for State Institutions."]

On motion the Board adjourned at 12:20 m. to 1:15 p. m.

Afternoon Session, 1:30 P. M.

President Wells, Prof. Fall, Doctors Milner and Granger, and Secretary Baker were present at the afternoon session.

On motion of Doctor Baker, the Board suspended the regular order of business, and proceeded to consider items of special business.

On motion of Dr. Baker, the secretary was authorized to place the order for sanitary journals for use of the office and for the members of the Board, for 1897.

The secretary read a letter, and list of Farmer's Institutes to be held in January and February, 1897, from K. L. Butterfield, Director of the Farmer's Institutes in Michigan. The communication requested the Board to designate just what Institutes the members could attend and what each member's subject would be. Although no formal action was taken, it was understood that the secretary would have the list of institutes hektographed and a copy sent to each member of the Board, whereupon he would indicate just which institutes he could attend and what his subject would be. It was also understood that the secretary would correspond with the local committees in the different places and endeavor to arrange for local sanitarians to discuss sanitary subjects.

The subject of better laws for the registration of births and deaths was presented by the secretary. He presented the following circular from the "special committee of the Michigan State Medical Society to petition the Legislature with reference to an improved plan of registering births and deaths":—

SPECIAL COMMITTEE of the

MICHIGAN STATE MEDICAL SOCIETY

TO PETITION THE LEGISLATURE WITH

REFERENCE TO AN IMPROVED PLAN OF REGISTERING BIRTHS AND DEATHS.

MEMBERS.

LEARTUS CONNOR, Detroit, Chairman.
GEO. E. RANNEY, Lansing, Secretary.
EUGENE BOISE, Grand Rapids.
WM. J. HERDMAN, Ann Arbor.
HENRY B. BAKER, Lansing.

Lansing, Mich., December 1, 1896.

To the Members of the State Medical Society, Physicians, and Sanitarians generally, of Michigan:

GENTLEMEN—The committee of the State Medical Society, appointed to petition the Legislature for an improved system of registering Births and Deaths, begs to report that active efforts have been made to draw up a satisfactory plan of legislation for this purpose, and desires to direct the attention of the members of the profession and the people of the State generally, to the importance of this matter—the prompt and accurate registration of births and deaths and more especially of causes of deaths in Michigan.

It seemed preferable to propose two bills of similar form, one providing for the registration of deaths and the other for the registration of births. While it is very desirable that the births that occur in Michigan be accurately registered, more especially for legal purposes, the accurate registration of

deaths is of such paramount sanitary importance that we have determined to direct our chief efforts during the coming session of the Legislature to the attainment of this end. We therefore ask, and confidently expect, your hearty assistance in obtaining a law that will give us an accurate and prompt registration of deaths throughout the entire State of Michigan.

THE PRESENT LAW IS VERY DEFECTIVE.

The necessity for an immediate revision of the law appears from an extract taken from the letter of Hon. Washington Gardner, Secretary of State, prefixed to a recent volume of the Annual Registration Report of Michigan:

"These statistics, except those of marriages, which are fully returned under the marriage license law of 1887, are collected and returned to this Department under the old registration law of 1867, as amended in 1869, which law has proved utterly inadequate for the purposes for which it was devised.

"The returns of both births and deaths are deficient to such a degree that they would require to be increased by at least sixty per cent to correctly represent the actual numbers of births and deaths that occurred. It results that proper legal records are not preserved of many births and deaths that occur in the State, and that the statistics based upon the registration returns have never been reliable. It is humiliating to confess, but strictly true, that after over twenty-five years of State registration under the present system in Michigan, we have no birth-rates or death-rates for the State, or for even a single county of the State, that are approximately correct, or that would command respect for a moment with those familiar with vital statistics. * * * *

"It is urgently recommended that prompt legislative action be taken to remedy this unsatisfactory condition of affairs by the passage of a registration act more in accordance with modern requirements. State registration, if worth doing at all, and from its sanitary, social and legal applications it is unquestionably an important and necessary function of the State, is worth doing well. Money spent for imperfect and incorrect returns is largely wasted; money expended upon a reliable system of vital statistics will bear abundant interest in sanitary and social improvement."

THE PLAN PROPOSED.

The general design of the proposed registration law is very simple and may be outlined as follows:

1. Certificates of death signed by physicians with respect to the cause of death (at present such certificates are required only in certain cities under their local ordinances but not under the State law).
2. Burial or removal permits issued by the local registrar, who is the clerk (or health officer) of the township, village or city.
3. The registrar records each certificate in his register of deaths.
4. The registrar mails monthly the certificates of deaths to the Secretary of State at Lansing, who preserves, indexes, and compiles them, and publishes the information in his Annual Registration Report and in Monthly Bulletins of Mortality.

NO RED-TAPE OR ADDED EXPENSE.

The plan is simpler than that at present in operation. It will secure accurate results—there is no question about this, for such a system, in all essential details, has been in operation in the State of New York since 1884. Besides, precisely similar systems of registration have been in operation in many of the cities of Michigan for years (*e. g.*, Detroit, Grand Rapids, Bay City, Lansing, Flint, etc., etc.), and have proved themselves entirely practicable. It will give prompt returns, so that reliable information in regard to unusually prevalent causes of death can be issued within 15 days after the close of each month.

One of the most prominent defects of the present system, and the chief cause of the inaccuracy of the returns, is the unnecessary delay that ensues from the occurrence of deaths to their registration. The average interval at present is about nine months! It is nearly two years from the occurrence of deaths before the Registration Reports relating to them appear, and thus very much of the timely interest and immediate sanitary value of these statistics is lost.

The expense of each item registered will be less than under the present system. This economy is attained by utilizing the results of the city systems of registration now in operation.

DISPENSES WITH EXPENSIVE AND INACCURATE COPYING AND RE-COPYING OF THE RETURNS.

Under the present law, every entry of a death is written three times—once by the supervisor, and twice by the county clerk. Very annoying mistakes occur, especially with respect to causes of

death, which quite invalidate the returns, owing to careless or ignorant copying. It is difficult or impossible in many cases to trace an error back and to correct it. Under the proposed law, only one transcript of the certificate will be required, and the original returns will be preserved and made the basis of compilation.

PHYSICIANS ONLY SHOULD CERTIFY TO CAUSES OF DEATH.

Under the present law, the supervisor picks up his information in regard to the cause of death in any manner that seems fit—probably in most cases from the families or friends of decedents. As a result of ignorance of medical terminology, some very worthless and astonishing returns are made. Such, for example, as “fits,” “chronic,” “rash,” “sore inside,” “yaller ganders” (by which is meant jaundice!), etc., etc., are very common. In many instances the reported causes of death are entirely worthless for sanitary or statistical purposes. The remedy for this condition of affairs lies in the passage of the proposed bill, which provides that physicians shall certify to the causes of death, and in case of any misunderstanding, or error under that head, correspondence will be had with them directly, not through unqualified unprofessional channels. This plan is now in vogue in Minnesota, Maine and other states, and works admirably, a great improvement resulting in the registration of causes of deaths.

HEALTH OFFICERS DEMAND BETTER VITAL STATISTICS.

At the Third Annual Conference of Michigan Health Officers, held at Ann Arbor, July 16-17, 1896, the following resolution was presented and unanimously adopted:

Whereas, Reliable statistics constitute so important a basis for the development of the sanitary service of the State, and since the methods of collecting these statistics in this State are such that gross errors may be made, we, members of the conference of health officers of the State of Michigan, petition the coming Legislature to pass a bill for the immediate registration of births and deaths

V. C. VAUGHAN, M. D.,
S. P. DUFFIELD, M. D.,
O. L. DALES, M. D.,
J. F. HICKS, M. D.,
A. D. HAGADORN, M. D.,
S. S. FRENCH, M. D.,

Committee.

HOW YOU CAN AID THE COMMITTEE IN OBTAINING THE NECESSARY LEGISLATION.

We believe that the foregoing outline of our objects, and the methods by which the committee seeks to accomplish them, will meet your cordial approbation. The plan devised will have the sanction of the Committee of the State Conference of Health Officers, appointed for the same purpose as ourselves, of which Dr. Victor C. Vaughan is chairman; the Committee of the State Board of Health, Dr. Henry B. Baker; and of Hon. Washington Gardner, Secretary of State, whose Department has practical charge of the State registration system. Dr. Cressy L. Wilbur, Chief of the Division of Vital Statistics in the State Department, has aided this committee in its work.

If you can, then, make an effort to interest the members-elect of the incoming Michigan Legislature who reside in your vicinity in this subject, and impress them with the importance of having adequate modern legislation providing for the accurate registration of births and deaths, we feel that you will render us great service in our work. Also, in case any provision or suggestion occurs to you which would seem desirable for embodiment in the bill, personal correspondence with any of the members of the committee or with the secretary will be highly appreciated.

As soon as the bill is formulated and presented to the Legislature, this committee will advise you further in regard to its provisions, and will endeavor to enlist your aid in obtaining petitions in its favor from various sources.

Yours fraternally,

LEARTUS CONNOR.
GEO. E. RANNEY,
EUGENE BOISE,
WM. J. HERDMAN,
HENRY B. BAKER,

Committee of the Michigan State Medical Society.

The secretary also presented a letter (dated Dec. 2, 1896) which he had received from George E. Ranney, M. D., secretary of the above-mentioned Committee of the State Medical Society, stating the importance of concert of action, and urging the State Board of Health to aid in securing the improved laws at the next session of the Legislature.

This being a special meeting and time being limited, no formal action was taken, but it was understood that the subject should be brought to the attention of the Board at its regular quarterly meeting in January, 1897.

Secretary Baker mentioned that at the Ann Arbor meeting (July 16 and 17, 1896) a special committee was appointed to prepare, for the outgoing and for the incoming Governors of Michigan, a statement relative to the past work, results, etc., of the State Board of Health, and relative to proposed changes in the public-health laws at the coming session of the legislature. The Committee appointed was: Prof. Fall and Judge McAlvay. Prof. Fall reported that the committee had not completed the Statement. In lieu of the above-mentioned statement, Secretary Baker presented a proposed special biennial report to the present Governor and to the incoming Governor of Michigan.*

(Doctor Milner left at this time in order to catch his train for Grand Rapids.)

The secretary read the proposed special report.

On motion, the Board voted that the report be hektographed, a copy sent to each member of the Board for criticism and approval; when approved, that the report be sent to the present and incoming Governors.

The secretary presented and read a communication (dated Sept. 15, 1896) from Theo. R. MacClure, relative to a paper on "A Quarter-Century of Public-Health Work in Michigan."

(At this time it was necessary for Doctor Granger to leave the meeting in order to take a train. This left the Board without a quorum.)

No action was taken relative to the communication from Mr. MacClure; because, after Doctor Granger left, no quorum was present. The members present seemed to favor the plan, and it was understood that the communication should be again presented at the January, 1897, meeting of the Board.

The Board adjourned at 4:45 p. m.

REGULAR MEETING AT LANSING, JANUARY 8, 1897.

The State Board of Health met in regular quarterly meeting in the office of the secretary at Lansing, Jan. 8, 1897. The meeting was called to order at 3:30 by President Frank Wells of Lansing. The other members present were: Prof. Delos Fall of Albion, Hon. Aaron V. McAlvay of Manistee, and Secretary Henry B. Baker.

The secretary read the minutes of the regular meeting of the Board Oct. 9, 1896. On motion of Judge McAlvay the minutes were approved.

The secretary read the minutes of the special meeting of the Board Dec. 3, 1896. On motion of Prof. Fall the minutes were approved.

State Board of Health vouchers 2720 and 2730 to 2748, inclusive, were allowed. On motion of Doctor Baker Prof. Fall's voucher (2748) and Judge McAlvay's voucher (2747) for expenses incurred in attending the regular meeting of the Board Jan. 8, 1897, were allowed subject to the

* This biennial report is printed on subsequent pages of this annual Report.

certificate of the member and the endorsement of the president and secretary.

Prof. Fall mentioned that Dr. Rolland L. Parmeter of Albion had recently brought to his attention an outbreak of pneumonia which tended to show the communicability of the disease. Prof. Fall presented Doctor Parmeter's written statement relative to five cases and two deaths, which all seemed to have been spread directly, one after another, from preceding cases.

Doctor Baker remarked somewhat as follows: That pneumonia is a germ disease has been demonstrated; that it is a dangerous communicable disease there is no question. It is now known that exposure to cold and to the germ causes pneumonia. There are at least two species of germs either one of which causes pneumonia. Just which one was present in the outbreak Prof. Fall mentioned was not ascertained, but it would be an exceedingly interesting fact. Probably after a time we shall be able to distinguish the different forms of the disease due to the different germs. But, before this can be done, physicians who have such outbreaks in charge ought to see that, from the germs present, cultures are made by some competent bacteriologist, and records should be made of the signs and symptoms, so that these may be compared with those outbreaks due to the different germs. Pneumonia is a disease which causes many deaths in Michigan in every year; and while the State Board of Health has done much for the education of the people preparatory to its restriction, the Board has not yet recommended isolation of patients sick with pneumonia, as in diphtheria, scarlet fever, and small-pox. It is anxious to collect all information it can bearing upon the subject, and upon the modes by which pneumonia is spread, in order that, as soon as practicable, the best measures may be recommended for its restriction. Such outbreaks only come to our attention occasionally; there should be an effort to collect as many facts as practicable for study.

Prof. Fall said that he would try and send samples of the sputa from some of these cases, if it was not too late; perhaps other cases would develop from which he could secure samples and send them to Prof. Vaughan for examination at the State Laboratory of Hygiene.

Mr. Wells and Judge McAlvay expressed the view that the subject of the restriction of pneumonia is an important one, but that this was not an opportune time to bring it before the people. Prof. Fall and Doctor Baker also expressed the same opinion. However, the members agreed that it is important that every such outbreak as mentioned by Prof. Fall should be recorded for study.

On motion of Doctor Baker, the Board voted to direct the secretary to prepare copy, and have printed as soon as practicable an abstract of the proceedings of this meeting, in pamphlet form, to the number of 1,200 copies.

On motion of Doctor Baker, the secretary was directed to print in the abstract of this meeting the subject of pneumonia presented by Prof. Fall.

On motion of Doctor Baker, the secretary was directed to print in the pamphlet abstract the Board's Biennial report to the "present and to the incoming Governor of Michigan". The Board also directed the secretary to have made for distribution reprints of the Board's Biennial Report to the Governors.

The secretary presented a report relative to his special investigation of the sanitary conditions at Delray, Michigan. The report was received and placed on file.*

On motion of Doctor Baker, the Board directed the secretary to edit and reprint the four-page leaflet [124] "The Prevention of Typhoid Fever", to the number of 10,000 copies, for distribution to school teachers, and to the neighbors of premises placarded for that disease.

Secretary Baker presented the subject of a new disinfectant—Formaldehyde, and asked the attention of the Board to the claims being made for its efficiency, economy, and general usefulness, as a disinfectant. It is obtained by partially burning methyl alcohol, commonly called wood alcohol, in such manner as to remove from it two atoms of its hydrogen. Formic Aldehyde is said to be a volatile, rapidly diffusing gas, having nearly the same specific gravity as air; it is exceedingly penetrating and, it is claimed, will destroy cultures of typhoid fever and of diphtheria germs even when they are folded in mattresses and bedding. It is claimed that it is as easily managed as the fumes of burning sulphur, and that it has the very great merit of disinfecting without the destruction, discoloration or decoloration of even the finest fabrics. Dr. Baker thought it desirable that the State Board of Health take measures to ascertain whether or not Formic Aldehyde has advantages as a disinfectant.

On motion of Dr. Baker, the Board voted to refer the subject of the new disinfectant—formaldehyde—to Prof. Fall with request that he investigate and report regarding its efficiency.†

On motion of Doctor Baker, the Board voted that the expenses of members in attending Farmers' Institutes, where not paid from the Farmers' Institute fund, be paid from the appropriation for this Board.

Secretary Baker presented a proposed memorial to Michigan members of Congress relative to a permanent census service of the United States.

The proposed memorial‡ was slightly amended and unanimously adopted by the Board as follows:—

WHEREAS, The bill "to provide for a permanent census service" reported to Congress by Hon. Carroll D. Wright, will be of great usefulness to the sanitary service of this State as follows:—(1) By providing a more frequent statement of population, thereby affording a basis for reliable vital rates and a more accurate calculation of intercensal population, upon which such rates depend; (2) By providing means for ascertaining, for the first time in the history of the census, a reliable representative death-rate for the State which will be comparable with those of other States and countries—Michigan being now a so-called non-registration State; (3.) If Michigan shall become a registration State by act of the present Legislature for the immediate registration of deaths, by providing an annual comparative compilation of its data in connection with those of other registration States, thereby greatly increasing the usefulness of the Michigan Statistics; therefore be it

Resolved, That the Michigan State Board of Health, at its quarterly meeting held at Lansing, January 8, 1897, urgently recommends the passage of the bill for a permanent census service, on the ground of the improvement that will result therefrom to the sanitary interests of the country; and therefore

Resolved, That a copy of this resolution be sent to each Senator and Representative from Michigan in Congress, with the request that they labor for the passage of the measure.

Secretary Baker presented a proposed memorial to Michigan members of Congress against the passage of Senate Bill No. 1552, relative to anti-vivisection in the District of Columbia.

* Printed on subsequent pages of this annual Report.

† A preliminary report by Prof. Fall was made at the regular meeting, April 9, 1897, on a subsequent page of this Report.

‡ The memorial as adopted is hektograph No. 1746.

On motion of Prof. Fall, the preamble and resolutions* were unanimously adopted as follows:—

WHEREAS, Senate Bill 1552 "For the further prevention of cruelty to animals in the District of Columbia," is now pending in the United States Senate, and it is believed by this Board that such a law would cause great and lasting damage and obstruction to future scientific work in this country;

Resolved, That we, the members of the Michigan State Board of Health make urgent appeal to our Senators and Representatives in Congress, and respectfully memorialize them to use vigorous effort to prevent the passage of Senate Bill 1552.

Resolved, That the Secretary of this Board is directed to transmit a copy of the foregoing preamble and resolution to each Michigan Senator and Representative in Congress.

Secretary Baker presented a proposed memorial to the members of the Michigan legislature relative to improved laws for the registration of vital statistics. The memorial was slightly amended and adopted as follows:—

WHEREAS, Under the present system of registration of vital statistics, which has remained without alteration or improvement since 1869, there is failure to obtain a large proportion of the births and deaths that actually occur in the State, and to obtain such data as are collected in time to be of the greatest practical use to the work of this Board; therefore be it

Resolved, That the Michigan State Board of Health respectfully petitions the Michigan Legislature to pass a law that shall provide for the early registration of all deaths that occur in the State, requiring certificates of deaths, and making provision for an early publication of results so that they shall be available for the use of this Board and of local health officers in their every-day work of restricting diseases in this State.

As a special committee on the subject, Doctor Baker presented and read a written preliminary report relative to a proposed celebration of the Twenty-fifth Anniversary of the establishment of the Michigan State Board of Health.

On motion the Board took a recess at 6:20 p. m. to meet again at 7:30 p. m.

Evening Session, Jan. 8, at 7:30 P. M.

The Secretary presented a proposed Bill, to be presented to the legislature of 1897, in which the State Board would ask for an appropriation. The Bill was carefully considered. The title of the Bill was slightly amended, the amount to be asked for was changed to six thousand dollars, and the bill was then approved.

On motion of Prof. Fall, the report, presented by Doctor Baker as special committee, relative to the Twenty-fifth Anniversary of the establishment of the Board, was received and placed on file.

The Secretary presented and read a communication dated Sept. 15, 1896, from Theo. R. MacClure, Chief Clerk in the Office, in which permission was requested to compile (under the direct supervision of the Secretary and in office hours when not otherwise engaged), a comprehensive statement relative to "A Quarter Century Public-Health Work in Michigan," to be published in pamphlet form or in the annual report of the Board.

On motion of Prof. Fall, the Board voted to accept the suggestion by Mr. MacClure, and to authorize the work to be done in accordance with the above-mentioned communication.

The Secretary read a paper he had prepared relative to the lessening of

* The preamble and resolutions will be found in hektograph No. 1747.

scarlet fever in England and in certain States in the U. S. The title of the paper is as follows:—"Scarlet Fever has been Greatly Lessened by the People acting on the Advice of the State Board of Health. Should not that advice be more generally accepted and acted upon?"

On motion of Prof. Fall, the Board voted to receive Doctor Baker's paper relating to the lessening of scarlet fever, and relative to the lack of restriction of dangerous diseases in Detroit, and that the paper and illustrating diagrams be published in the annual report of the Board.*

The subject of sanitary conventions was mentioned by Prof. Fall. The members discussed the advisability of holding some of those popular meetings. Considering the extra press of work in the office during the meeting of the legislature, and considering the fact that the members were given considerable time by taking part in Farmers' Institutes, and that at the present time no invitation for a sanitary convention was before the Board, the holding of sanitary conventions was postponed for a few months.

On motion the Board adjourned at 10:45 p. m.

REGULAR MEETING AT LANSING, APRIL 9, 1897.

The meeting was called to order by President Wells. The members present were Prof. Fall, Judge McAlvay, Doctors Gray, Milner and Baker.

The secretary read a letter he had received stating that Doctor Granger would be unable to attend the meeting.

On motion the regular order of business was suspended, and President Wells stated to the Board what had been proposed with regard to dispossessing the Board of its present quarters. He stated that while Doctor Baker was away the Board of Auditors, the Railroad Commissioner, and others visited the office after the clerks were gone, but unexpectedly found the janitor in the rooms. They talked in a manner which would indicate that it had been decided to give the Board's office rooms to the Railroad Commissioner. The janitor immediately informed Mr. MacClure, and Mr. MacClure immediately informed him. Steps were taken to get in communication with the Board of Auditors, and in the evening an audience with the Board was secured. It was found that the suspicion with regard to the situation was true. After some talk with two members (Mr. Gardner and Mr. Steele) arrangements were made for a joint meeting of the Board of State Auditors, the Railroad Commissioners, and the State Board of Health, today, Friday, April 9, 1897, at 3:00 P. M.

The secretary read the minutes of the last regular meeting of the Board at Lansing, Jan. 8, 1897. The minutes were approved as read.

This being the time for the annual address of the president of the Board, Hon. Frank Wells addressed the Board at length giving a resumé of the work of the Board for the past year, and suggested some new lines of work which the Board could profitably undertake.†

Prof. Fall remarked that so long as the membership of this Board remains as it is it seems very important that Mr. Wells continue in the office of president; an office which he has so admirably filled in the past.

* This paper by Dr. Baker is to be printed on subsequent pages of this volume.

† President Wells' address is printed in full on subsequent pages of his annual report.

On motion of Prof. Fall, the Board unanimously elected Mr. Wells to the position of president for the ensuing two years.

Mr. Wells thanked the Board for the honor conferred upon him.

On motion of Prof. Fall, the Board voted to print 1,200 copies of the pamphlet proceedings of this meeting, to include the annual address of the president.

On motion of Judge McAlvay, it was voted to have 3,000 reprints made of the president's address, for distribution.

On motion of the secretary, the Board voted to pay the expenses of Prof. Fall incurred in attending and taking part in the meeting of the Michigan Academy of Science at Ann Arbor.

On motion of Doctor Milner, the Board voted that, when practicable, official telegrams, telephone messages, etc. of members, should be paid at the office, or charged to the office.

State Board of Health vouchers numbers 2750, 2758 to 2782 and 2788, inclusive, were allowed.

The Board took a recess from 12:30 M. to 2:00 P. M.

Afternoon Session, at 2:00 P. M.

According to appointment, the Board immediately proceeded to the office of the Board of State Auditors where the members remained until 3:45 P. M. Besides the three members of the Board of Auditors, and six members of the State Board of Health, the Railroad Commissioner, Mr. Sybrant Wesselius and Mr. Wedemeyer his deputy, were present.

Mr. Wesselius stated that he wished more office room, and as he understood that the clerks in the next room to his were doing ministerial work and could just as well be separated from the Chief of the Office, he had made application for the room next to his, now occupied by the clerks of the State Board of Health. He said it was necessary for his clerical force to be near him and be in the same building with the State Library. He also stated that he would not think of asking for the room, if he had not understood that it was not absolutely necessary for the clerks to be so near their chief.

President Wells addressed the meeting comparing the importance of the work of the Railroad Commissioner's office with that of the State Board of Health, and stated that it would not be just to dispossess of its office room a Board that had been in existence nearly a quarter of a century, and had occupied the rooms since the building of the State Capitol.

Mr. Gardner, chairman of the Board of Auditors, said that their Board did not doubt the importance of the work of the State Board of Health, and that the question would probably not be decided upon that point of justice. It was just a demand for more room, which must sooner or later be met.

Judge McAlvay then addressed the meeting, and said that as far as he had been able to find there was no law which gave the Board of State Auditors jurisdiction as regards the assignment of rooms; and, as a matter of fact he could find no provision for the Board of State Auditors occupying the rooms they now occupied. He also made the point that the State Board of Health had occupied the rooms ever since the building had been completed, that the rooms were planned for them by the

Board of Building Commissioners, and that every means possible would be used to hold possession of their office rooms. He intimated that if necessary the Supreme Court might be asked whether the Board of State Auditors had jurisdiction. He also stated for the benefit of the Railroad Commissioner that the clerks in the office in question were not doing ministerial work but were all needed in the executive work of the office.

Questioning the jurisdiction in the particular case, seemed to surprise the Board of State Auditors, but Mr. Wesselius seemed to think that the Supreme Court should be appealed to, he to represent the Board of State Auditors, and Judge McAlvay to represent the State Board of Health.

The Railroad Commissioner then stated that of course he would much prefer the rooms directly under his and now occupied by the Supt. of Public Instruction. This seemed to be an opening, the Board of Auditors sent for Mr. Hammond the Supt. of Public Instruction.

Mr. Hammond was willing to give up his store room, if he could have the room directly under his own office for a store room. This question concerning the State Librarian, Mrs. Spencer was sent for.

Mrs. Spencer said she would be willing to give up her store room if she could have equally convenient and commodious rooms.

The Railroad Commissioner had to leave, as did Mr. Land Commissioner French, and as there seemed to be nothing to be done the conference broke up.

[In connection with the proposed removal or dispossession of the room occupied by the State Board of Health, see statement on a similar proposal in 1890, at the time of assignment of rooms to the Banking Commissioner. This statement is printed on pages lv-lviii of the Report of the State Board of Health for 1890.]

The State Board of Health reconvened in the secretary's office at 3:45 P. M. and proceeded with the regular meeting of the Board.

On motion of Prof. Fall, the Board voted to appoint Doctors Vaughan and Novy delegates to represent the Michigan State Board of Health at the International Congress of Medicine at Moscow, Aug. 19-26, 1897.*

The secretary presented the question whether there should be printed in the annual report for 1896 in connection with the article on tyrotoxin, a part or all of an article by Prof. Vaughan entitled "A Poison-Producing Bacillus found in Ice-Cream and Cheese."

On motion of Doctor Gray, the Board voted that the secretary should use a part or whole of Doctor Vaughan's article as his judgment dictated, after examination of the subject.

Prof. Fall, special committee to whom was referred the subject of the new disinfectant—formaldehyde—made a preliminary report upon the efficiency and practical utility of the new disinfectant. Although Prof. Fall was not ready to make a complete report, he stated that his investigations seemed to show that formaldehyde was the coming disinfectant. When properly used he believed it to be an efficient destroyer of germs, and its practical utility was apparent because of its simplicity

* Doctors Vaughan and Novy made no written report of their attendance, saying there was nothing of public health importance to report. Their expenses were not paid by the Board of Health.

and cheapness. Although this disinfectant is extremely deadly to all forms of life, it is not a dangerous disinfectant to use; and then again it does not injure clothing, silver, etc., as is quite likely to be the case with sulphur fumes when not properly used. Because of its cheapness and simplicity, Prof. Fall was inclined to believe that the disinfectant would be kept ready for use in every household, not only for killing germs but to destroy carpet beetles, moths, etc. which are so annoying to the housewife, and destructive to property.

Prof. Fall exhibited one of the disinfecting stoves, and explained the way the formaldehyde was made. Formaldehyde is a gas, formed by partial burning of common wood-alcohol in the presence of a limited amount of air, and passing the vapors over finely divided platinum or copper. Although formaldehyde had been known since 1868, it is only recently that its use as a disinfectant was found practicable.

Prof. Fall also stated that there were two methods of getting rid of formaldehyde after disinfection had been completed: (1) by opening the doors and admitting fresh air; and (2) by forcing the vapor of ammonia into the room through the key-hole. One quart of wood-alcohol would disinfect about 2,000 cu. ft. air space, at a cost of about twenty cents.

Prof. Fall also exhibited a liquid solution (about 40%) of formaldehyde which could be used as a spray-disinfectant.

On motion of Prof. Fall, the Board voted to allow a voucher made out to Eli Lilley and Co. to the amount of four dollars (\$4), for Eli Lilley formaldehyde lamp, provided that company submitted a bill.

On motion of Doctor Baker, the Board voted to request Prof. Fall to make a complete written report relative to his investigations in connection with the subject of formaldehyde, and that the report be published in the annual report of the Board.*

The secretary presented the subject of a proposed sanitary convention in Detroit, to be held under the auspices of the State Board of Health, in accordance with an invitation from the W. C. T. U. of Detroit. The secretary also read several letters, petitions, etc. relative to the proposed sanitary convention.

The subject was discussed, and the members seemed to think the holding of the convention should be temporarily postponed until a more opportune time, probably in the fall of 1897. If any convention was held, the invitation from Hanover, should take precedence.

On motion of Judge McAlvay, the invitation to hold a sanitary convention at Hanover, was accepted.

On motion of Doctor Baker, Prof. Fall was made a committee of one to visit Hanover, confer with a local committee, and make arrangements for the convention.

The secretary presented his report of work done in the office during the first quarter in 1897. The report was accepted and placed on file. [It is printed on subsequent pages of this annual report of the Board.]

The secretary presented his report relative to the restriction of measles in Detroit. The report was accepted and placed on file.

Doctor Gray asked relative to a Conference of Health Officers at Ann Arbor, in 1897. It was thought impracticable to hold the conference at Ann Arbor, because of the absence of Doctors Vaughan and Novy. [No Conference was held.]

* No written report has been received.

On motion of Judge McAlvay, the Board voted to hold a Conference of Michigan Health Officers at Lansing, in July, 1897.

On motion of Doctor Gray, the president and secretary were made a committee to make arrangements for the proposed Conference.

Judge McAlvay, committee on legislation, reported that the committee had done considerable work in connection with proposed public-health legislation. He believed that the prospects for hostile legislation were not good, as the people and especially the legislators were tired of threshing over old straw, the question of the utility of the Board had so frequently been proved. Then again the animus against the Board was such that the legislators would not give it consideration.

As it was necessary for Doctor Gray to leave for Pontiac, and the Board would be without a quorum, on motion, the Board adjourned at 5:05 P. M.

SPECIAL MEETING AT HANOVER, MICH., JUNE 3, 1897.

The State Board of Health met in special meeting pursuant to the following call by the president of the Board:—

“A special meeting of the State Board of Health is hereby called to meet at Hanover, June 3, 1897, probably after the evening session of the Sanitary Convention, for the examination of plans and specification for proposed new buildings at the Upper Peninsula Asylum for the Insane, at Newberry, and for the transaction of such other business as may properly come before the Board at that time.”

The meeting was called to order at 6:15 P. M. by President Frank Wells, of Lansing. The other members present were: Prof. Delos Fall of Albion, Doctor Fred Belknap of Niles, and secretary Henry B. Baker, M. D., of Lansing.

While waiting for the plans and specifications, on motion of Doctor Baker, the voucher of Prof. Fall for expenses incurred in making arrangements for the Hanover Sanitary Convention, was allowed, subject and according to his certificate.

Doctor Belknap stated facts in a case of a physician at Niles who holds himself out as an abortionist, and profanely declares that he will not report diseases dangerous to the public health. His failure to report was investigated, by the local health officer, who had him arrested, whereupon the prosecuting attorney had the case “Nolle prossed”, on the ground that a city ordinance of Niles covered the case and that therefore it was the duty of the city attorney to attend to the subject. Doctor Belknap asked the view of members of the Board as to how the case should be prosecuted further.

As the city attorney says there is no such ordinance, it was suggested that the prosecuting attorney be asked to point out the particular ordinance to which he referred.

Mr. Wells presented the subject of a revised document or “primer” for the use of teachers in complying with Act 146 of the laws of 1895. He said the present leaflet (No. 226) was an admirable one but condensed, and that a more complete and self-explanatory document should be made.

The subject was discussed. On motion of Doctor Baker, seconded by Doctor Belknap, Prof. Fall was requested to prepare and present to the Board at its regular meeting in July, 1897, a document explanatory of

the subjects required to be taught in compliance with Act 146 laws of 1895.

The plans and a portion of the specifications for a cottage building, and for a kitchen-and-dining-room building at the Northern Asylum for the Insane were then examined. Mr. Charlton, the architect, and Mr. Fairbairn, a trustee of the Asylum, were present to explain the plans.

At 7:30 P. M. the Board took a recess until after the evening session of the Sanitary Convention.

Second Session, at 10:00 P. M., June 3.

The meeting was called to order again at 10:00 P. M., the same persons being present as were present when the Board took a recess.

The examination of the plans and specifications was proceeded with until after midnight when Mr. Fairbairn and Mr. Charlton withdrew in order that the Board might take any formal action it saw fit.

On motion of Prof. Fall, the plans and specifications were referred to the president and secretary for further examination, with the view also of having Mr. Ainge, of the office of the Board, examine certain details; and with the view also of such investigation as is practicable of buildings heated and ventilated by the fan-blower method; after which a proposed report of the Board shall be prepared by the secretary, hextographed and sent to each member of this Board for amendment or approval before the same shall be submitted to the Board of Trustees of the Upper Peninsula Hospital for Insane.

The Board then adjourned.

[The results of the examination and the recommendations of the Board concerning these plans and specifications will be found printed on a preceding page of this annual report.]

QUARTERLY REPORTS OF WORK IN THE OFFICE OF THE
SECRETARY OF THE STATE BOARD OF HEALTH
DURING THE FISCAL YEAR ENDING JUNE
30, 1897.

For each regular meeting of the State Board of Health the Secretary prepares a report of work in the office during the preceding quarter. The abstracts of these might be published with the proceedings of the several meetings; but are collected and published here in order to bring the reports of work in the office all together.

In the report of work for the last quarter of 1896, on subsequent pages, is a summary relative to communicable diseases in the calendar year 1896.

Following these quarterly reports will be found a general report for the fiscal year 1897:—

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND OF THE CONDITIONS OF HEALTH GENERALLY IN MICHIGAN, DURING THE QUARTER ENDING SEPTEMBER 30, 1896.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: for diphtheria, 69; for scarlet fever, 62; for typhoid (and typho-malarial) fever, 237; for measles, 52; for whooping-cough, 59; and for consumption, 49. Total for the six diseases, 528.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 2,287.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the quarter to the number of 1,542.

The "final" reports of outbreaks received and filed during the quarter were: for diphtheria, 45; scarlet fever, 59; typhoid and typho-malarial fever, 84; measles, 85; whooping-cough, 30; consumption, 24. Total for the six diseases, 327.

TABLE 1.—THIRD QUARTER OF 1896.—*Exhibiting the numbers of outbreaks of Diphtheria, Scarlet fever, Typhoid fever, Measles, Whooping-cough, and Consumption, from July 1, to September 30, 1896, of which notice was received at the Office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, July 1 to September 30, 1896.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	69	7	60	20	20
Scarlet fever	62	5	67	0	33
Typhoid fever.....	237	18	36	31	33
Measles.....	52	19	70	20	10
Whooping-cough.....	59	29	47	29	24
Consumption	49	49	63	16	21
Average for the six diseases.....		19	50	25	25

During the quarter, the local columns of 1,750 newspapers, have been looked over for reports of occurrences of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 5 outbreaks of diphtheria, 3 outbreaks of scarlet fever, 42 outbreaks of typhoid and typhomalarial fever, 10 outbreaks of measles, 17 outbreaks of whooping-cough, and 24 cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table.

Compiling, Editing, Proof-reading, Printing, etc.

The annual reports from health officers and clerks, for the year 1895, have been compiled, so far as making a statement of the number of cases and deaths which occurred in each township, city or village.

The compilation of reports from all sources relative to "Measles in Michigan in 1894" has been completed, and the compilation proved; the compilations relative to "Small-pox in Michigan in 1894" has been proved; the compilation relative to "Consumption in Michigan in 1894" has been made, and the compilation proved; the compilation of reports relative to "Whooping-cough in Michigan in 1894" has been proved; and the proving of the compilation of reports relative to "Typhoid Fever in Michigan in 1894" has been completed. (The compilations for the foregoing-mentioned subjects are for the annual report of the Board for 1895, now being printed.)

The compilation of reports from all sources relative to "Diphtheria in Michigan in 1895" is about one-third completed; the compilation relative to "Consumption in Michigan in 1895" has been made; and the compilation of reports relative to "Scarlet Fever in Michigan in 1895" is well under way. (These compilations are for the annual report of the Board for 1896.)

For the annual report for 1895, the article "Consumption in Michigan in 1894" and the article "Measles in Michigan in 1894" have been made nearly ready for the printer. The tables for the article on "Typhoid Fever in Michigan in 1894" have been made. Short articles relative to mumps, typhus fever, hog cholera, poisoning from dried beef and pressed chicken, r  theln, whooping-cough, and foot and mouth diseases, have been partially prepared. Considerable work has been done on the introduction to the communicable-disease articles for the Report for 1895.

The article "Time of Greatest Prevalence of Each Disease in Michigan in 1894" has been completed ready for the printer. The article for the succeeding year has been commenced.

The article on "Meteorology in Michigan in 1895" has been well commenced.

The preparation of the "First Part" of the annual report for 1896, has been commenced.

The copy for the proceedings of the Third Annual Conference of Health Officers, held at Ann Arbor, July 16 and 17, 1896, has been prepared and sent to the printer.

Proof has been read on "Part I" and on more than half of the article on "Meteorology" for the annual report for 1895.

(It is hoped that by the end of the fourth quarter of 1896 the annual report for 1895 will have been printed and ready for distribution, and the annual report for 1896 will have been about one-half printed. This will bring the work in connection with the printing of the annual reports of this Board nearly up to date.)

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the director of the Michigan Weather Service, at Lansing, for his use; it is then sent by him to the Chief of the U. S. Weather Bureau at Washington, D. C.

Ozone test-paper, sufficient to last three months, was sent to 11 meteorological observers for this Board.

The tables for the article on "Meteorology in Michigan in 1895" have been completed, several exhibits have been made, and some of the text for the article has been prepared.

Meteorological registers have been received, and examined for errors, for each of the 15 stations in Michigan, and the computations made for the months of June, July and August, 1896.

Making Diagrams and Maps.

The following diagrams and maps have been made:—

Diagrams 3, 4 and 5, to illustrate the article on Weekly Reports of Sickness, in Michigan in 1895.

Diagram—Infant Mortality in Michigan for each of the 25 years, 1870-94, etc.

Map—Movement of Contagium of Diphtheria in Michigan in 1894.

Diagram—Isolation and Disinfection restricted Scarlet Fever in Michigan in 1894.

Map—Distribution of Diphtheria in Michigan in 1894.

Map—Distribution of Scarlet Fever in Michigan in 1894.

Diagram—Comparison of Death-Rates in Michigan from Scarlet Fever and Small-pox, before and since the State Board of Health was established, etc.

Diagram—Isolation and Disinfection restricted Scarlet Fever, Diphtheria, Measles and Typhoid Fever in Michigan during the five years, 1890-94.

Hektograph Work.

More than the usual amount of hektograph work was done during the quarter. In all 4,729 pages were made, including 1,170 pages, weekly and monthly bulletins, "Health in Michigan"; 1,136 pages, "Some of the work of the State Board of Health has to stop for lack of appropriation"; 275 pages, "An earnest plea for better restriction of consumption"; 250 pages, "A plea for State Health Work"; 225 pages, circular letters to the Mayors of Cities, Presidents of Villages and Supervisors of Townships relative to return of name of health officer; 120 pages, "The restric-

tion of consumption. State Hospitals for Indigents"; 110 pages, "Attempts to copy Michigan's Progress. Sickness Statistics"; 94 pages, "A Bogus Doctor Factory Ousted"; 90 pages, report of proceedings of the special meeting held at Ann Arbor, July 16 and 17, to examine the plans for proposed new ward for the Michigan Asylum for the Insane at Kalamazoo; 88 pages, reports of the investigations made by Dr. G. H. Cattermole of an outbreak of milk sickness in Lockport Township, St. Joseph Co., an outbreak of typhoid fever at Downingtown, Sanilac Co., and an outbreak of diphtheria and scarlet fever at Niles; 80 pages, "Health Officers Should Act on Diagnosis of Reliable Physician;" 80 pages relative to the discussion of papers read by Dr. Vaughan and Prof. Clinton D. Smith at the Conference of Health Officers held at Ann Arbor, July 16 and 17, and 75 pages, "A new danger to the public health."

The remaining pages consisted principally of blanks and circular letters for use in the office.

Accessions to the Library, Card-Cataloguing, etc.

About 124 books and pamphlets, and some 300 numbers of journals (weeklies, monthlies and quarterlies) have been received and entered in the library accession book.

Considerable work has been done in card-cataloguing the library.

Work in keeping up the financial accounts of the office has been continued.

Return of Name and Address of Health Officers, for 1896-97.

A special effort has been made during the quarter to secure the return of the name and address of as many health officers as was practicable. Aug. 21, 1896, a fourth official demand and a typewritten letter was sent to 13 mayors of cities, 47 presidents of villages and 128 supervisors of townships, from which no health officer had been reported, urging these officers to comply with section 1634 Howell's statutes. In reply to this request, health officers were returned from the 13 cities, from 21 villages, and from a number of townships. However, there were 26 villages yet delinquent, and, on Sept. 22, a circular letter (No. 1707) was sent to the president of 26 villages yet delinquent, stating that unless a health officer was appointed and returned to this office in accordance with the law, the subject of the non-compliance with the State law would be placed in the hands of the prosecuting attorney.

At the end of the third quarter (Sept. 30) health officers had been returned from more townships, cities and villages, than for previous years. Every city had complied with the law, and there yet remained delinquent 19 villages and 64 townships. An effort will be made through the prosecuting attorneys of the various counties to secure returns from these 19 delinquent villages.

General Distribution of Leaflets and Diagrams.

To teachers and others, there have been sent 150 copies of the leaflet No. 226 and about 150 sets of the several different leaflet publications bearing upon the subject of teaching in the schools the modes of spread-

ing and the best methods for the restriction and prevention of the dangerous communicable diseases. For lack of available appropriation, the distribution to this class of public-health workers has been necessarily limited, mainly to those teachers and others who applied for those publications.

About the usual number of pamphlets on the restriction and prevention of the dangerous communicable diseases were sent to health officers of localities in which dangerous diseases have been reported. It was at the same time requested of these health officers that the pamphlets be distributed to the *neighbors of the persons sick with such diseases* and to other persons likely to be benefited by the information therein contained. In response to special requests of sanitarians in this and other States and countries, copies of the annual report, proceedings of sanitary conventions held in Michigan under the auspices of the State Board of Health, and pamphlets on the restriction and prevention of the dangerous communicable diseases, have been sent where it was thought likely to benefit public-health interests. However, the distribution of the Board's publications has been much less than usual because of the lack of sufficient appropriation. The annual report for 1894 has for several months been ready for distribution, but no funds will be available for this purpose until the first of the coming year; by that time it is hoped that the report for 1895 will also be ready for distribution.

The usual record of the distribution of publications has been kept.

Reprinting Leaflets, Pamphlets, Circulars, Diagrams, etc.

Circular [162], blue-letter relative to typhoid fever, was slightly amended and printed to the number of 500 copies for use in the office.

SPECIAL INVESTIGATION:

Alleged Typhoid Fever in the village of Downington, Sanilac county.

W. A. Mills, prosecuting attorney of Sanilac county, wrote to this office requesting that some person be sent to the village of Downington, Sanilac county, for the purpose of investigating an alleged outbreak of typhoid fever in that village. In compliance with this request, Dr. Geo. H. Cattermole was sent (Aug. 25, 1896) to make the investigation. He was engaged in the work on Aug. 25, 26 and 27. Typhoid fever was found at Downington. The sanitary condition of the village was found to be very much neglected; the water-supply liable to contamination, and this was the probable cause of the great amount of sickness in the village. The people were advised to remove the excreta from their premises, to improve the system of drainage, and as a precaution against typhoid fever and bowel diseases to boil all drinking water.

Documents, published by the State Board of Health, treating on the prevention of typhoid fever and the sanitary care of persons having that disease, were distributed among the people; the health authorities were advised to take measures for a better sanitary condition of the place and so indirectly to reduce the possibility of an infected water-supply.

Outbreak of Milk Sickness in Lockport township, St. Joseph county.

W. M. Ikeler, M. D., health officer of the city of Three Rivers, applied to this office for some person to be sent to investigate an alleged outbreak of Milk Sickness in the township of Lockport, Sanilac county. In compliance with this request, Dr. Cattermole was sent to Three Rivers, Aug. 28, 1896, to make the investigation.

It was learned that the disease known as "Trembles" had appeared among animals which had been pastured on the bottom lands of the St. Joseph river; that the disease had been transmitted to the people using milk from milch cows pastured on these bottom lands. There had been 9 cases and one death from the disease known as "Milk Sickness."

The people had taken the cattle off these pastures. The health officer of Three Rivers was advised to give notice to the dairymen of that city that milch cows should not be pastured on the low lands until the cause of this disease was determined.

Diphtheria and Scarlet Fever at Niles.

Information was received at this office of the presence of diphtheria in the city of Niles. The health officer did not respond to a letter of inquiry relative to diphtheria sent from this Office. Later a letter was received from a citizen of Niles asking that some one be sent to investigate the alleged presence of diphtheria in that city. Dr. Cattermole was instructed to start for Niles, Sept. 25, 1896. By request of this office, Dr. Rockwell, health officer of Kalamazoo, met him at the train in that city, and gave him tubes and swabs for making bacterial tests for diphtheria. Both diphtheria and scarlet fever were found in Niles. Diagnosis of diphtheria was confirmed by the bacteriological test. The outbreak had been neglected, no placarding of premises, and but feeble attempts at isolation had been made. The attending physicians, member of the school board, health officer and mayor of the city were seen, and advised to employ rigid measures for the restriction of the diseases; this they promised to do, and the city marshal was instructed to placard the houses at once.

Typhoid Fever at Menominee.

Typhoid fever had for some time been present in Menominee, and was increasing. In a letter dated Aug. 5, Hon. John F. Hicks, health officer of that city, in behalf of the city council, requested the secretary to visit Menominee, in company with Mr. Benzenberg, city engineer of Milwaukee, Wis., for the purpose of investigation and report upon a safe water supply for that city; the expenses to be met by the city. October 7 a telegram was received from Dr. Hicks fixing the time. Accordingly I started at once for Menominee, reaching there the evening of August 10, from which time until the morning of Aug. 14, I was continuously engaged making a thorough investigation of the probable origin of the typhoid fever, the present condition of the sewerage system and of the water supply, with a view to recommending what should be done with reference to the water supply. Mr. Benzenberg and myself agreed that it would be well for us to unite in a report, but the officers of the city, becoming impatient at the delay caused by difficulty in collecting neces-

sary facts, Sept. 18, I sent a preliminary report embodying facts relative to the sanitary conditions, indicating that specific recommendations formulated by Mr. Benzenberg would be sent later. A copy of this preliminary report is herewith submitted.*

Immigrant Notices.

During the third quarter of 1896, notices were received at this office from Dr. J. H. Senner, U. S. Commissioner of Immigrants at New York City, stating that measles had occurred on board seven steamships arriving at that port, and having aboard passengers destined for points in Michigan. Copies of the notices were mailed to the health officers of the several places of destination, as under:—

Steamship.	Date of arrival.	Disease exposed to.	Notices sent to the health officers of:—
Elysia	July 2	Measles	Detroit.
Palatia.....	" 25	Measles	Grand Rapids.
Patria	" 30	Measles	Detroit.
St. Louis.....	August 28.....	Measles	Traverse City.
City of Rome ..	" 29	Measles	Bay City.
Teutonic	September 2.....	Measles	Grand Rapids, Detroit, Hancock, Bay City, Traverse City, Elk Rapids and Breitung Tp.
Patria	" 7.....	Measles	Detroit.

WORK IN CONNECTION WITH SICKNESS STATISTICS.

During the third quarter of 1896, 1,916 blank postal report cards, 180 blank postal receipt cards, 24 blank return postal cards, 150 record-books, 142 printed circular letters and 16 hektographed circular letters regarding weekly card-reports, have been mailed to 159 health officers and regular correspondents; 1,071 weekly card-reports have been received and entered on the register; 50 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 110 copies of the hektographed monthly bulletin, "Health in Michigan," were mailed each month. These bulletins have been consolidated for this quarterly report. The compilation of the weekly card-reports of sickness during the year 1894, for the annual report for 1895, has been completed during this quarter. Work has also been done on the compilation of the weekly card-reports of sickness during the year 1895, for the annual report for 1896.

Health in Michigan in the Third Quarter of 1896. Communicable Diseases.

Compared with the preceding quarter (April, May and June), reports from all sources show *typhoid fever* to have increased by an average of *seventy-six* places per month, *measles* to have decreased by an average of *thirty-seven* places per month, *scarlet fever* to have decreased by an average of *fifteen* places per month, *whooping-cough* to have increased by an average of *two* places per month, *small-pox* to have decreased by an average of *two* places per month, *diphtheria* to have decreased by an average of *one* place per month, and *consumption* to have decreased by an average of *one* place per month, in the third quarter of 1896.

* The report is to be found in Part II. in the article relative to Typhoid fever in Michigan in 1896.

Meteorology at one Central Station, and Sickness throughout Michigan from all causes, Third Quarter of 1896, Compared with the Preceding Quarter.

A comparison of meteorological conditions of the third quarter of 1896, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been south-southwest, (instead of southeast,) the velocity 2.7 miles per hour less, the temperature 4.14 degrees higher, the rainfall 2.89 inches more, the absolute and relative humidity more, the day and night ozone less and the depth of water in the observation well at Lansing one inch more in the third quarter of 1896.

Compared with the preceding quarter, (April, May and June,) the reports from regular observers show a marked increase of cholera infantum, typhoid fever, dysentery, cholera morbus, diarrhea and remittent fever and a marked decrease of influenza and pleuritis in the third quarter of 1896.

The Weather and the Health in Michigan in the Third Quarter of 1896, Compared with the Average for the Corresponding Quarters in the Ten Years, 1886-1895.

A comparison of the meteorological conditions of the third quarter of 1896, with the average for the third quarters in the ten years, 1886-1895, shows that in 1896, the prevailing direction of the wind was south-southwest, (instead of southwest,) the velocity was .1 of a mile per hour greater, the temperature was .50 of a degree lower, the rainfall was 3.23 inches more, the absolute and relative humidity were more, the day and night ozone were less and the depth of water in the observation well at Lansing was 22 inches less.

Compared with the average in the corresponding quarters in the ten years, 1886-1895, the reports from regular observers indicate that typho-malarial fever, intermittent fever, whooping-cough, consumption, remittent fever, cholera infantum, inflammation of bowels, dysentery and cholera morbus were less than usually prevalent, and that typhoid fever was more than usually prevalent in the third quarter of 1896.

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND OF THE CONDITION OF HEALTH GENERALLY IN MICHIGAN DURING THE QUARTER ENDING DECEMBER 31, 1896.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: For diphtheria, 144; for scarlet fever, 102; for typhoid and typho-malarial fever, 156; for measles, 62; for whooping-cough, 45; and for consumption, 41. Total for the six diseases, 550.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 2,966.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the quarter to the number of 2,188.

The "final" reports of outbreaks received and filed during the quarter were: For diphtheria, 91; scarlet fever, 73; typhoid and typho-malarial fever, 188; measles, 41; whooping-cough, 39; consumption, 35. Total for the six diseases, 467.

During the quarter, the local columns of 1,929 newspapers, have been looked over for reports of occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 5 outbreaks of diphtheria, 4 outbreaks of scarlet fever, 26 outbreaks of typhoid and typho-malarial fever, 7 outbreaks of measles, 5 outbreaks of whooping-cough, and 7 cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE I.—FOURTH QUARTER OF 1896.—*Exhibiting the numbers of outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-cough, and Consumption from October 1, to December 31, 1896, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, Oct. 1 to Dec. 31, 1896	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	144	3	40	40	20
Scarlet fever	102	4	75	0	25
Typhoid fever.....	156	17	58	42	0
Measles.....	62	11	43	29	28
Whooping-cough.....	45	11	40	40	20
Consumption.....	41	17	43	14	43
Average for the six diseases.....		10	52	33	15

Summary Relative to the Year 1896.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the year 1896, are as follows: For diphtheria, 419; for scarlet fever, 385; for typhoid and typho-malarial fever, 563; for measles, 310; for whooping-cough, 218; for consumption, 316; and for small-pox, 8. Total for the seven diseases, 2,219.

Not including telephone and verbal messages, the number of communications relative to dangerous communicable diseases, received and placed on file during the year, was 10,012.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the year to the number of 7,619.

The "final" reports of outbreaks received and filed during the year 1896, were: For diphtheria, 328; scarlet fever, 321; typhoid and typho-malarial fever, 491; measles, 224; whooping-cough, 119; consumption, 128; small-pox, 8. Total for the seven diseases, 1,619.

During the year 1896, the local columns of 6,571 newspapers have been looked over for reports of occurrences of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 27 outbreaks of diphtheria, 14 outbreaks of scarlet fever, 86 outbreaks of typhoid and typho-malarial fever, 32 outbreaks of measles, 36 outbreaks of whooping-cough, 1 outbreak of small-pox, and 70 cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE II.—YEAR 1896.—*Exhibiting the number of outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-cough, Small-pox and Consumption, from January 1 to December 31, 1896, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, Jan 1, to Dec. 31, 1896.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	*419	6	48	37	15
Scarlet fever	*385	4	50	29	21
Typhoid fever.....	*563	15	48	47	5
Measles	*310	10	53	38	9
Whooping-cough	*218	17	50	42	8
Consumption	*316	22	56	23	21
Small-pox.....	*8	13	100	0	0
Average for the seven diseases		12	51	37	12

* The number of outbreaks given in this table do not necessarily agree with the numbers given in tables in another part of the Annual Report, for the reason that all alleged outbreaks, of which information was obtained from the newspapers and other sources are included in this table. If the health officers denied that such outbreaks occurred, or if they make no responses to the letters sent from this office, relative to newspaper reports, such alleged outbreaks are not included in the compilation of that disease.

For the purpose of facilitating the proper action for the restriction of every "disease dangerous to the public health," and to make it possible to compile the important "contagious-disease statistics," a record is kept of facts concerning every outbreak of a "disease dangerous to the public health" upon which action is taken by this office, and also of every important communication relating thereto received or sent out. This required over 17,631 entries to be made in the "Record Books," one of which books is kept for each dangerous communicable disease.

During the year 1896, compared with the year 1895, action was taken on outbreaks of dangerous communicable diseases as follows: On diphtheria, 8 outbreaks more; scarlet fever, 144 outbreaks less; typhoid and typho-malarial fever, 70 outbreaks less; measles, 134 outbreaks more; whooping-cough, 141 outbreaks more; small-pox, 17 outbreaks less; and consumption, 7 outbreaks more than in 1895. In all, 56 outbreaks more were acted upon in 1896 than in 1895, and 124 outbreaks more in 1895 than in 1894; but an accurate comparison cannot easily be made, for the reason that no action was taken relative to whooping-cough, until July 1, 1895.

Small-pox in Michigan During the Year 1896.

At the beginning of the year small-pox was still present in Detroit. Eight new outbreaks of small-pox were reported during the year. These were in Riga township, Lenawee Co.; Inlay township, Lapeer Co.; Saginaw city; Ionia city; Greenbush township, Clinton Co.; Burlington township, Lapeer Co.; Marine City and Bay City. The outbreak reported at Greenbush township was afterwards reported as measles. Final reports have been received from each of the remaining seven outbreaks. These final reports show that outside of Detroit, there have occurred in the State, during the year 1896, 16 cases and 2 deaths, and that in every one of the seven outbreaks the infection was restricted to the one house in which it first occurred.

Every one of those outbreaks was due directly or indirectly to infection spread from Detroit. The outbreak which began in Detroit in May, 1894, was reported closed during the week ending March 28, 1896, but for the week ending April 18, 1 new case was reported which died. During the year 1896 there have occurred in the city of Detroit 21 new cases and 14 deaths; this, with the 2 cases which were still sick at the close of the year 1895, make a total of 23 cases and 14 deaths in the city of Detroit during the year 1896. (From the beginning of the outbreak in May, 1894, until its ending in April, 1896, there occurred in the city of Detroit 298 cases and 85 deaths.)

Since April 18, 1896, up to the close of the year 1896, the State is believed to have been entirely free from small-pox.

Compiling, Editing, Proof-reading, Printing, Etc., Fourth Quarter of 1896.

The compilation of "Diphtheria in Michigan in 1895" has been finished and proved. The compilation of reports, letters, etc., from all sources relative to "Scarlet Fever in Michigan in 1895" has been made and proved. The compilation relative to "Typhoid Fever in Michigan in 1895" is nearly finished and proved as far as completed. Compilations of material relative to "Nuisances in Michigan in 1895" and relative to

"Injuries and Loss of Life and Property from Kerosene and Gasoline in Michigan in 1895" have been made.

The article on "Typhoid Fever in Michigan in 1894" has been completed. Short articles relative to Measles, Consumption, and Small-pox in Michigan in 1894 have been made ready for the printer.

Considerable work has been done in connection with the introduction or summary of the Communicable-Diseases articles for the Annual Report for 1895. The statement is a summary relative to some of the pecuniary results of the Board's efforts in the saving of life and the prevention of sickness. This summary has been reprinted in pamphlet form for distribution. It is reprint No. 472. It was sent to members of the Legislature and to editors of newspapers; many newspapers published a notice of it; one such notice, in the State Republican, November 25, 1896, is reproduced further on in this report.

The index for the Report for 1895 has been completed, and the printing of it will immediately commence.

For the Report for 1896, but relating to the year 1895, articles have been prepared on subjects as follows: Rabies, chicken-pox, puerperal fever, lump-jaw, tetanus, cholera infantum, danger from careless dog poisoning, diseased meat and milk, tuberculosis in cattle, glanders, disease in hogs, syphilitic ozena.

The preparation of copy for the Annual Report for 1896 is well under way to completion. It is hoped that during the next quarter the Report will be printed. More than half of the copy is now practically ready for the printer.

The article "Time of Greatest Prevalence of Each Disease in Michigan in 1895" has been well commenced.

The article relative to "Meteorology in Michigan in 1895" is nearly completed and ready for the printer.

The copy for the "First Part" of the annual report of the Secretary for the fiscal year ending June 30, 1896, has been completed and a portion of it has been sent to the printer.

Proof has been read and an immense amount of printing has been done during this quarter. Over 450 pages of the Annual Report for 1895 have been printed. The Report is all completed with the exception of printing the index and binding the volume.

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the director of the Michigan State Weather Service, at Lansing, for his use; it is then sent by him to the chief of the U. S. Weather Bureau, at Washington, D. C.

The regular yearly supply of meteorological material, consisting of blank registers, blanks for measurements of ground-water, stamped envelopes, blank postal cards, was sent to each of 18 meteorological observers; there was also sent to 13 observers a supply of ozone test-paper sufficient to last three months.

The following maps and diagrams have been made to illustrate the Annual Report of this Board:

Map—Movements of Contagion of Typhoid Fever in Michigan in 1894.

Map—Distribution of Typhoid Fever in Michigan in 1894.

Map—Movements of Contagium of Small-pox in Michigan in 1894.

Map—Movements of Contagium of Measles in Michigan in 1894.

Map—Distribution of Measles in Michigan in 1894.

Diagram—Decreasing Death-rate in Michigan from Scarlet Fever per 10,000 inhabitants.

Diagram—Increasing Life Saving in Michigan, from Scarlet Fever, per 10,000 inhabitants.

Diagram—Reported Deaths from Small-pox in Michigan, during each of the 26 years, 1869-94.

Diagram—Decreasing Death-rate in Michigan, from Small-pox, per 10,000 inhabitants.

Diagram—Increasing Life Saving in Michigan, from Small-pox, per 10,000 inhabitants.

Diagram—Typhoid Fever in Duncan Township, Michigan.

Diagram—Isolation and Disinfection Restricted Typhoid Fever in Michigan in 1894.

Diagram—Decreasing Death-rate in Michigan, from Typhoid Fever, per 10,000 inhabitants.

Diagram—Reported Deaths in Michigan from Typhoid Fever for each of the 27 years, 1868-94.

Diagram—Isolation and Disinfection Restricted Measles in 1894.

Diagram—Alleged Nuisance in Colon Township, St. Joseph Co., Michigan.

Diagrams 1, 2, 3, 4, 5, 6—Average Temperature, Average Daily Range of Temperature, Absolute and Relative Humidity, Fogs and Rainfall, relating to conditions in Michigan during the year 1895.

Meteorological registers from 11 stations have been received and examined for errors, and computations of the registers from these stations for the months of September, October, and November, 1896, have been made.

Accessions to the Library, Card-Cataloguing, Etc.

About 75 books and pamphlets, and some 300 numbers of journals (weeklies, monthlies and quarterlies) have been received, mostly in exchange for our publications, and entered in the library accession book.

Considerable work has been done in card-cataloguing the library.

Work in keeping the financial accounts of the office has been continued.

Hektograph Work.

Hektograph work to the amount of about 2,930 pages has been prepared, including 1,140 pages of weekly and monthly bulletin "Health in Michigan;" 408 pages of proceedings of regular and special meetings; pages of a "Special Biennial Report of the State Board of Health to the present and incoming Governors;" 100 pages relative to examination of plans and specifications for proposed public buildings; 277 pages relative to delinquent card reports, etc.

Educational Leaflets to School Teachers, etc.

To teachers and others, there have been sent some 2,166 copies of the four-page leaflet No. 226; 900 copies of the leaflet No. 227; and about 742

sets of the several different leaflet publications of this office bearing upon the subject of teaching in the schools the modes of spreading and the best methods for the restriction and prevention of the dangerous communicable diseases.

Of the above-mentioned 2,166 copies of the leaflet No. 226, about 900 copies were distributed to teachers and others during the meeting of the State Teachers' Association, at Lansing, December 28-30, 1896.

For the lack of available appropriation, the distribution of the Board's publications to this class of public-health workers has been necessarily small; mainly to teachers and others who applied for them.

State Teachers' Association, Lansing, Dec. 28-30, 1896.

At the meeting of this association a paper on "School Hygiene" was read by Prof. W. E. Conkling, of Dowagiac, and discussed by Prof. J. L. Wagner, of Charlotte. Before the College section of the association, a paper was read by Prof. Delos Fall, Albion College, member of the State Board of Health, on "A College Course in Sanitary Science." This paper was followed by an address by Prof. Victor C. Vaughan, M. D., of the University of Michigan, and the subject was discussed by others.

To facilitate the teaching of sanitary science in colleges and high schools, Prof. Fall has made a list of publications of the Michigan State Board of Health, arranged in order to serve as data for a college or high-school course in sanitary science. This list and the publications mentioned therein have been sent to Prof. Montgomery, at Olivet College, and Prof. Sloan, at Hillsdale College, since the meeting of the State Teachers' Association. It is understood that the subject will be taught at both of these colleges. Other colleges and high schools might receive the publications, but probably not all such schools could be supplied with all of the publications.

Annual Reports from Health Officers for the Year 1896.

Work has been done to prepare for securing the annual reports from health officers. Two blanks and a circular letter have been made ready, and envelopes to the number of 1,584 have been addressed to health officers of townships, cities and villages. Each envelope contains one circular letter No. 218, one copy of blank "I," and one blank form "Copy of Record" of diseases dangerous to the public health in 1896. These supplies will be sent out during the first week in January, 1897.

General Distribution of Leaflets, Diagrams, Etc.

About the usual numbers of pamphlets on the restriction and prevention of the dangerous communicable diseases were sent to health officers of localities in which dangerous diseases have been reported. It was at the same time requested of those health officers that the pamphlets be distributed to the *neighbors of the persons sick with such diseases* and to other persons likely to be benefited by the information therein contained.

In response to special requests of sanitarians in this and other States and countries, copies of the Annual Report, proceedings of sanitary conventions held in Michigan under the auspices of the State Board of Health, and pamphlets on the restriction and prevention of the dangerous dis-

eases, have been sent where it was thought likely to benefit public-health interests. However, the distribution of the Board's publications has been much less than usual, because of the lack of sufficient appropriation. The Annual Report for 1894 has for many months been ready for distribution, but no funds have been available for this purpose. The appropriation for 1897 will become available January 1, 1897, and it is hoped that the 1894 Report can then be distributed. The Report for 1895 is nearly ready for distribution. About 1,390 wrappers have been addressed for use in sending out the Report of this Board for 1894.

The usual record of the distribution of publications has been kept.

Printing and Reprinting Pamphlets, Circulars, etc.

During this quarter no pamphlet, leaflet, circular, etc., has been reprinted which would necessitate mention here.

In December the new slip [234] relative to life saving has been printed to the number of 10,000 copies and already widely distributed, in letters and other communications being sent out.

This new slip is here reproduced as follows:

[234.]

RECENT SAVING OF SICKNESS AND LIFE IN MICHIGAN.

EQUAL TO OVER FIVE MILLION DOLLARS SAVED TO THE TAX PAYERS.

"The Secretary of the State Board of Health has just published (in Reprint No. 472) official statistics on the results of the life-saving work of that Board, which show that through compliance with the recommendations of that Board during the five years, 1890-94, there were probably saved to the people of Michigan 112,843 cases of sickness and about 5,261 deaths, from the four diseases—diphtheria, scarlet fever, typhoid fever and measles. At a very low estimate* the money value thereby saved the State during these five years is \$5,097,800, or over one million dollars per year, from these four diseases. If all the dangerous diseases were considered, the saving would undoubtedly be much more.

"The State Board of Health exists for the purpose of guarding the highest interests of every man, woman and child in Michigan; and, if it had the coöperation of all, and its advice was fully complied with, the results of the work would be still more effective. As it is, the money values saved to the people of the State greatly exceed the cost of the public-health work, being, in fact, nearly half as much as the entire amounts required to sustain the State government and all the State institutions. From an unhealthful State, Michigan is fast becoming one of the most healthful."—*State Republican*, November 25, 1896.

Special Investigation of Sanitary Conditions at Delray, Mich.

During this quarter the Secretary had received letters, petitions, etc., from Delray, Michigan, relative to the alleged unsanitary conditions and the prevalence of disease. After conference with the President of this

* "The basis on which this estimate is made is as follows:—For medical attendance and other necessary expenses in each case of sickness, \$20; for each funeral prevented, \$40; value of each life saved, \$500. (Before the late war a slave was worth about \$800, for what it would earn over and above its cost of maintenance, and now the courts count an average person's life worth about \$5,000—ten times the amount used in this estimate.)"

Board, and after correspondence with the Health Officer and others at Delray, the Secretary investigated the complaints. The Secretary's report (hektograph 1741) will be found herewith. [Printed in connection with "Typhoid Fever in Michigan" in another portion (Part II.) of this Report.]

Special Biennial Report to the Present and to the Incoming Governor of Michigan.

Since the last meeting, the Secretary has transmitted to the Hon. John T. Rich, the present Governor, and Hon. Hazen S. Pingree, the incoming Governor of Michigan, the "Special Biennial Report of the State Board of Health, relative to public-health laws, and proposed legislation in the interests of public-health." The report is submitted herewith. (Hektograph No. 1728.) [Printed on preceding pages.]

Immigrants Exposed to Contagious Diseases and Destined to Settle in Michigan.

During the fourth quarter of 1896, notices were received at this office from Dr. J. H. Senner, U. S. Commissioner of Immigrants at New York City, that measles had occurred on board five steamships, and scarlet fever on board one steamship, arriving at that port, and having on board passengers destined for points in Michigan. Copies of these notices were mailed to the health officers of the several places of destination, as under:—

Steamship.	Date of arrival.	Disease on board.	Notices sent to the health officers of:
Friesland.....	Oct. 6...	Measles.....	Detroit, Kalamazoo.
Phönicia.....	Nov. 8...	".....	Greenville.
Lucania.....	" 14...	".....	Iron Mountain, Lansing.
St. Louis.....	" 22...	Scarlet fever.....	Lake Linden, Ishpeming.
Campania.....	" 28...	Measles.....	Iron Mountain.
Karlsruhe.....	Dec. 13...	".....	Detroit.

A notice was also received November 10, from the Surgeon of the SS. Canada, which arrived at Quebec, November 5, stating that measles had occurred on board. A copy of this notice was sent to the Health Officer at Sault Ste. Marie, one of the passengers being destined for that city.

Work in Connection With Sickness Statistics.

During the fourth quarter of 1896, 1,869 blank report, receipt and return postal cards, 130 record books, 64 printed and 261 hektographed circular letters regarding weekly card-reports, have been mailed to 318 health officers and regular correspondents; 1,156 weekly card-reports have been received and entered on the register; 49 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 110 copies of the hektographed monthly bulletin, "Health in Michi-

gan," were mailed each month. These bulletins have been consolidated for this quarterly report. Considerable work has been done on the compilation of the weekly card-reports of sickness during the year 1895, for the Annual Report for 1896.

Health in Michigan in the Fourth Quarter of 1896. Communicable Diseases.

Compared with the preceding quarter, (July, August and September), reports from all sources show *typhoid fever* to have decreased by an average of *twenty-seven* places per month, *measles* to have decreased by an average of *three* places per month, *scarlet fever* to have increased by an average of *sixteen* places per month, *whooping-cough* to have decreased by an average of *seven* places per month, *diphtheria* to have increased by an average of *forty-three* places per month, and *consumption* to have increased by an average of *two* places per month, in the fourth quarter of 1896.

Meteorology at one Central Station, and Sickness Throughout Michigan from all Causes, Fourth Quarter of 1896, Compared with the Preceding Quarter.

A comparison of meteorological conditions of the fourth quarter of 1896, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been southwest, (instead of south-southwest), the velocity 2.8 miles per hour greater, the temperature 28.24 degrees lower, the absolute humidity much less, the relative humidity more, the day and night ozone less, the rainfall 4.07 inches less and the depth of water in the observation well at Lansing 5 inches more in the fourth quarter of 1896.

Compared with the preceding quarter (July, August and September), the reports from regular observers show a marked increase of diphtheria, pneumonia, influenza, tonsilitis, bronchitis and pleuritis and a marked decrease of diarrhea, typhoid fever, intermittent fever, and remittent fever in the fourth quarter of 1896.

The Weather and the Health in Michigan in the Fourth Quarter of 1896, Compared with the Average for the Corresponding Quarters in the Ten Years, 1886-1895.

A comparison of the meteorological conditions of the fourth quarter of 1896, with the average for the fourth quarters in ten years, 1886-1895, shows that in 1896 the prevailing direction of the wind was the same (southwest), the velocity was .1 of a mile per hour greater, the temperature was .44 of a degree higher, the rainfall was .86 of an inch less, the absolute humidity was less, the relative humidity was the same, the day and night ozone were less and the depth of water in the observation well at Lansing was 11 inches less.

Compared with the average in the corresponding quarters in the ten years, 1886-1895, the reports from regular observers indicate that intermittent fever, remittent fever, consumption, inflammation of bowels, scarlet fever, erysipelas, diarrhea and inflammation of kidney were less than usually prevalent in the fourth quarter of 1896.

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK DONE
IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND OF THE
CONDITION OF HEALTH GENERALLY IN MICHIGAN DURING THE
QUARTER ENDING MARCH 31, 1897.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: for diphtheria 150; for scarlet fever 85; for typhoid and typho-malarial fever 69; for measles 202; for whooping-cough 48; and for consumption 106. Total for the six diseases 660.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 3,044.

Relative to dangerous communicable diseases, letters, written cards and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the quarter to the number of 2,160.

The "final" reports of outbreaks received and filed during the quarter were: for diphtheria 137; for scarlet fever 93; for typhoid and typho-malarial fever 79; for measles 65; for whooping-cough 34; and for consumption 55. Total for the six diseases 463.

TABLE I.—FIRST QUARTER OF 1897.—*Exhibiting the number of outbreaks of Diphtheria, Scarlet fever, Typhoid fever, Measles, Whooping-cough, and Consumption from January 1, to March 31, 1897, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, Jan. 1, to Mar. 31, 1897.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	150	5	25	63	12
Scarlet fever	85	5	25	25	50
Typhoid fever.....	69	14	10	70	20
Measles.....	202	6	33	17	50
Whooping-cough.....	48	2	100	0	0
Consumption.....	106	4	50	25	25
Average for the six diseases.....		6	28	41	31

During the quarter, the local columns of 1,611 newspapers, have been looked over for reports of occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 8 outbreaks of diphtheria, 4 outbreaks of scarlet fever, 10 outbreaks of typhoid and typho-malarial fever, 12 outbreaks of measles, 1 outbreak of whooping-cough, and 4 cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the director of the Michigan State Weather Service, at Lansing, for his use; it is then sent by him to the chief of the U. S. Weather Bureau, at Washington, D. C.

Ozone-test paper sufficient to last three months was sent to 12 meteorological observers for this office.

Diagrams and maps were made to illustrate articles in the annual report for 1896, as follows:—

Diagram VIII—Ozone, average by day, months in 1895.

Diagram IX—Ozone, average by night, months in 1895.

Diagram X—Velocity of wind, by hours and months, Lansing, 1895.

Diagram XI—Velocity of wind, by months at stations, 1895.

Diagram XII—Wind, direction, at stations, by months in 1895.

Diagram XIV—Wind, direction, in Mich., year and months, 1895.

Diagram XV—Wind, direction, at stations in Mich., 1895.

Diagram XVI—Atmospheric Pressure, by months, in 1895.

Diagram 3—Reported deaths, by age and sex, from diphtheria, in Mich., 4 years, 1892-95.

Diagram 3—Reported deaths, by age and sex, from scarlet fever, in Mich., 3 years, 1893-95.

Diagram 1—Weekly reports of sickness in Michigan in 1895.

Diagram 2—Weekly reports of sickness in Michigan in 1895.

Diagram 3—Weekly reports of sickness in Michigan in 1895.

Diagram 4—Weekly reports of sickness in Michigan in 1895.

Diagram 5—Weekly reports of sickness in Michigan in 1895.

Diagram 2—Isolation and disinfection restrict diphtheria in Michigan in 1895.

Map—Outline county map of Michigan, (upper and lower peninsulas both shown on one page) on which to illustrate by lines, the directions and movements of contagium in dangerous diseases.

Map—Movements of contagium of diphtheria in Michigan in 1895.

Map—Movements of contagium of scarlet fever in Michigan in 1895.

Accessions to Library, Card-Cataloguing, etc.

About 117 books and pamphlets, and some 300 numbers of journals (weeklies, monthlies and quarterlies) have been received, mostly in exchange for our publications, and entered in the library accession book.

Considerable work has been done in card-cataloguing the library.

Work in keeping the financial accounts of the office has been continued.

Hektograph Work.

Hektograph work to the amount of 2,965 pages has been prepared, including principally 1,240 pages of weekly and monthly bulletins "Health

in Michigan;" 245 pages, blanks for office use; 195 pages, diagrams relative to measles; 157 pages of proceedings of the regular quarterly meeting Jan. 8, 1897; 121 pages, copy of correspondence with the health officer of Detroit and others, relative to measles, etc.

Annual Reports from Health Officers for the year 1896.

During the last days of Dec. 1896 work was done preparing to secure annual reports from health officers. Two blanks and a circular letter were made ready, and envelopes to the number of 1,584 were addressed to health officers of townships, cities and villages. This material constituted the "first request" and was sent from the office Jan. 4 and 5, 1897.

On Feb. 17, a "second request" was sent to the health officers of 564 townships, 29 cities, and 155 villages who did not respond to the first request.

In response to the first and second request, and at the end of this quarter annual reports had been received from the health officers of 936 townships, 56 cities, and 203 villages—a total of 1,195, leaving 392 local jurisdictions yet delinquent.

To the delinquent jurisdictions, on March 30, a "third request" was sent to the health officers of 280 townships, 20 cities and 92 villages.

Distribution of Educational Leaflets to Teachers and others.

To school teachers and others there have been sent some 450 copies of the four-page leaflet No. 226, and about 490 sets of publications of this office bearing upon the subject of teaching in schools the modes of spreading and the best methods for the restriction and prevention of the dangerous communicable diseases.

Distribution of the Annual Report for 1894.

During the first quarter of 1897 some 2,160 copies of the Twenty-Second Annual Report of the State Board of Health have been distributed. In addition to the annual report, other publications were sent as follows:—To health officers of townships, clerks of cities and villages, mayors of cities, and presidents of villages, circular No. 226 and the slip [234] relative to "Recent saving of sickness and life in Michigan;" to health officers of cities and villages the pamphlet proceedings [235] of the last regular meeting of this Board, pamphlet proceedings of the third annual conference of health officers, and the slip [234] relative to life saving; and to 46 meteorological exchanges the pamphlet proceedings of the last regular meeting, biennial report of State Board to Governors, reprint "Principal Meteorological Conditions in Michigan" in 1893 and also in 1894, a paper by the secretary relative to "The Causation of Influenza," the slip relative to life saving, and the reprint [472] relative to "Lives saved, sickness prevented, and money saved because of public-health work" in Michigan 1894.

General Distribution of Reprints, Leaflets, Diagrams, etc.

The pamphlet proceedings of the last regular meeting and the biennial report to Governors have been sent to 120 editors of newspapers; the biennial report has been distributed to 157 members of the legislature;

the biennial report, slip relative to lives saved, and the reprint [472] relative to life saving work in Michigan in 1894, have been sent to 416 editors of newspapers in Michigan. About 600 sets of circular [No. 226] and [234] and diagrams have been distributed at Farmers' Institutes.

Because of the unusual prevalence of measles, many more than the usual number of leaflets relative to the restriction of measles, have been sent out; but, excepting measles, about the usual number of pamphlets on the restriction and prevention of the different dangerous communicable diseases were sent to the health officers of localities in which the dangerous diseases have been reported. It was at the same time requested of these health officers that the pamphlets be distributed *to the neighbors of the persons sick with such diseases* and to such other persons as they would be likely to benefit. In response to special requests of sanitarians in this and other States, copies of annual reports, proceedings of sanitary conventions, proceedings of meetings of this board, and pamphlets on the restriction and prevention of the dangerous communicable diseases, have been sent where it was thought likely to benefit public-health interests.

The usual record of distribution of publications has been kept.

Return of Names and Addresses of Health Officers to Serve in 1897-98.

Considerable work has been done in connection with securing the names and addresses of health officers to serve in Michigan during the year 1897-98. Envelopes were addressed to 1,211 supervisors of townships, 295 presidents of villages, 295 clerks of villages, 76 mayors of cities and 76 clerks of cities. Each envelope contained a circular letter of instruction and a blank form for the return of the name and postoffice address of the health officer and an envelope addressed to this office for the return of the blank. These requests will be mailed from the office about April 8.

Much work has been done in getting in readiness the books in which are entered the names and addresses of the newly-appointed health officers.

Compiling, Editing, Proof-reading, Printing, etc.

The work of compiling data on meteorological registers from observers at 19 stations for the year 1896 has been in progress—computations for some of the tables being nearly completed.

The article on "Meteorological conditions in Michigan in 1895" was completed and is now in the hands of the State printer.

The compilation of reports from all sources relative to typhoid fever in Michigan in 1895 has been completed and the compilation proved. The material relative to measles in Michigan in 1895 has been compiled and compilation proved; the material relative to whooping-cough in Michigan in 1895 has been compiled and the proving well commenced; the material relative to consumption in Michigan in 1895 (previously compiled) has been proved; and the compilation of reports from all sources relative to small-pox in Michigan in 1895 has been commenced.

The index and table of contents for the annual report for 1895 have been completed and made ready for printer.

The articles "Diphtheria in Michigan in 1895" and "Scarlet Fever in Michigan in 1895" have been made ready for the printer. The articles relative to measles and typhoid fever in Michigan in 1895 are being writ-

ten and are well under way, and the article relative to nuisances in 1895 is well under way.

Considerable work has been done in preparing the introduction to the articles "Communicable Diseases in Michigan in 1895" for the annual report for 1896.

The article "Time of Greatest Prevalence of each Disease in Michigan in 1895" is nearly completed.

Twenty-two galleys of proof on the report for 1895 and seventy-three galleys on the annual report for 1896, have been read in addition to considerable other work in connection with proof-reading.

The printing of the last 50 pages of the report for 1895 has been completed and two hundred copies of the bound report have been received and a few distributed.

Printing on the report for 1896 has been well commenced; 152 pages having already been printed.

Reprinting Leaflets, Diagrams, etc.

In Jan. 1,000 copies of a single-page leaflet [Plate 844] "Isolation and Disinfection Restrict Measles in Michigan in 1894" were printed for distribution.

In Jan. the four-page leaflet [124] "The Prevention of Typhoid Fever" was amended slightly and reprinted to the number of 10,000 copies for distribution.

In Feb. the diagramatic leaflet [Plate 648] "Deaths in Michigan, 1876-87," were printed to the number of 200 copies, for use by the secretary before advisory council of the local board of health of Detroit. There were also printed 200 copies of [Plate 846] "Movements of Contagium of Measles in 1894" and [Plate 782] "Per cent of all deaths from measles were of persons within certain periods of age. Two years, 1892-3."

In March the two-page leaflet with [Plate 652] "Pathogenic Micro-organisms—"Germs" of Diseases" on one side, and [Plate 649] "Deaths in Michigan, 1884-93," on the other side, was reprinted to the number of 2,000 copies for distribution.

In March the two-page leaflet, with [Plate 681] "Low Water in Wells and Sickness from Typhoid Fever in Michigan, by months for a period of years 1878 and 1880-92" on one side, and [Plate 651] "Typhoid Fever and Sewers in Munich" on the other side, were reprinted to the number of 2,000 copies for distribution.

In March the third edition of 2,000 copies of the "Time Slip" were reprinted for use in the office.

Printing New Leaflets, Pamphlets, etc.

During this quarter no new leaflets, pamphlets, etc., were printed.

Immigrants Exposed to Contagious Diseases and Destined to Settle in Michigan.

During the first quarter of 1897, notices were received at this office from Dr. J. H. Senner, U. S. Commissioner of Immigrants at New York City, that measles had occurred on board three steamships, and small-pox on board one steamship, arriving at that port, and having on board passengers destined for points in Michigan. Copies of these notices were

mailed to the health officers of the several places of destination, as under:—

Steamship.	Date of arrival.	Disease on board.	Notices sent to the health officers of:
Lucania	Feb. 21...	Measles	Bay City, Detroit, Manistique, Saginaw.
Havel.....	Mar. 12...	Measles	Detroit.
Trave.....	Mar. 26...	Measles	Detroit, Calumet.
Southwark.....	Mar. 26...	Small-pox.....	Detroit.

Work in Connection with Sickness Statistics.

During the first quarter of 1897, 1,504 blank report, receipt and return postal cards, 107 record books, and 23 hektographed circular letters relative to weekly card reports, have been mailed to 119 health officers and regular correspondents; 1,107 weekly card reports have been received and entered on the register; 50 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 110 copies of the hektographed monthly bulletin, "Health in Michigan," were mailed each month. These bulletins have been consolidated for this quarterly report. Work has also been done on the compilation of the weekly card reports of sickness during the year 1895, for the annual report for 1896.

Health in Michigan in the First Quarter of 1897. Communicable Diseases.

Compared with the preceding quarter, (October, November and December) reports from all sources show *scarlet fever* to have decreased by an average of *four* places per month, *diphtheria* to have decreased by an average of *four* places per month, *measles* to have increased by an average of *seventy-eight* places per month, *typhoid fever* to have decreased by an average of *forty-three* places per month, *whooping-cough* to have increased by an average of *four* places per month, and *consumption* to have decreased by an average of *thirty-three* places per month. *Small-pox* was reported present at *one* place during the first quarter of 1897, this being the first case reported since April, 1896.

Meteorology at one Central Station, and Sickness throughout Michigan from all causes, First Quarter of 1897, Compared with the Preceding Quarter.

A comparison of the meteorological conditions of the first quarter of 1897, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been westerly, (instead of southwest,) the velocity 1.3 miles per hour greater, the temperature 10.22 degrees lower, the rainfall 1.13 inches more, the absolute humidity less, the relative humidity the same, the day and night ozone more and the depth of water in the observation well at Lansing 4 inches more in the first quarter of 1897.

Compared with the preceding quarter, (October, November and December) the reports from regular observers show a marked increase of measles, pneumonia, influenza, pleuritis and inflammation of kidney, and a marked decrease of diarrhea in the first quarter of 1897.

*The Weather and the Health in Michigan in the First Quarter of 1897,
Compared with the Average for the Corresponding Quarters
in the Eleven Years, 1886-96.*

A comparison of the meteorological conditions of the first quarter of 1897, with the average for the first quarters in the eleven years, 1886-1896, shows that in 1897 the prevailing direction of the wind was westerly, (instead of southwest,) the velocity was .6 of a mile per hour greater, the temperature was 2.21 degrees higher, the rainfall was .74 of an inch more, the absolute humidity was more, the relative humidity and the day and night ozone were less, and the depth of water in the observation well at Lansing was 9 inches less.

Compared with the average in the corresponding quarters in the eleven years, 1886-1896, the reports from regular observers indicate that consumption, diarrhea, erysipelas and pneumonia were less than usually prevalent and measles was more than usually prevalent in the first quarter of 1897.

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK DONE
IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND OF THE
CONDITION OF HEALTH GENERALLY IN MICHIGAN, DUR-
ING THE QUARTER ENDING JUNE 30, 1897.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: for diphtheria 107; for scarlet fever 84; for typhoid and typho-malarial fever 67; for measles 271; for whooping-cough 27; for consumption 77; and for small-pox 1. Total for the seven diseases 634.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 2,822.

Relative to dangerous communicable diseases, letters, written cards and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the quarter to the number of 1,977.

The "final" reports of outbreaks received and filed during the quarter were: for diphtheria 79; for scarlet fever 71; for typhoid and typho-malarial fever 39; for measles 176; for whooping-cough 15; for consumption 33; and for small-pox 1. Total for the seven diseases 414.

During the quarter, the local columns of 1,681 newspapers, have been looked over for reports of occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 1 outbreak of diphtheria, 1 outbreak of scarlet fever, 10 outbreaks of typhoid and typho-

malarial fever, 24 outbreaks of measles, 2 outbreaks of whooping-cough and 14 cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:—

TABLE I.—SECOND QUARTER OF 1897.—*Exhibiting the number of outbreaks of Diphtheria, Scarlet fever, Typhoid fever, Measles, Whooping-cough, and Consumption, from April 1, to June 30, 1897, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, April 1 to June 30, 1897	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria.....	107	1	100	0	0
Scarlet fever.....	84	1	0	100	0
Typhoid fever.....	67	15	30	30	40
Measles.....	271	9	46	17	37
Whooping-cough.....	27	7	0	50	50
Consumption.....	77	18	29	21	50
Small-pox.....	1	0	0	0	0
Average for the seven diseases		8	37	23	40

Small-pox in Michigan in the second quarter of 1897.

One outbreak of small-pox was reported during the quarter, at Blissfield township, Lenawee Co. On April 7 a letter was received from the health officer of Blissfield township saying that the diagnosis was disputed, and asking that some one be sent from the State Board of Health to consult in the case. Dr. George H. Cattermole was sent as a representative of this Board, who reported that while he had some doubts as to its being genuine small-pox, yet advised that the benefit of the doubt be given to the public safety, and that the same precautions be taken as in cases certainly small-pox. On May 28 a final report was received from the health officer, showing that eleven cases had occurred but no deaths, and that the disease was restricted to the one house in which it first occurred. In a letter accompanying the final report the health officer says:—

“The nurse, a woman 50 years of age, had varioloid when 10 years of age, but did not contract this disease, and she was with the eleven cases

constantly for four weeks. Had it not been small-pox why did she not contract it? As all others in the house old and young had it and the nurse had no symptoms. I do not believe that her having had small-pox would prevent her catching 'Contagious Impetigo.'"

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the Director of the Michigan Weather Service, Lansing, for his use; it is sent by him to the Chief of the U. S. Weather Bureau at Washington, D. C.

Ozone test-paper, sufficient to last three months, was sent to each of 12 meteorological stations, making observations for this office.

Diagrams and maps were made to illustrate articles in the annual report of this Board, as follows:—

Map—Distribution of Diphtheria in Michigan, in 1895.

Map—Distribution of Scarlet Fever in Michigan, in 1895.

Map—Movement of Contagium of Typhoid Fever in Michigan, in 1895.

Map—Distribution of Measles in Michigan, in 1895.

Map—Distribution of Typhoid Fever in Michigan, in 1895.

Map—Movement of Contagium of Measles in Michigan, in 1895.

Map—Distribution of Consumption in Michigan, in 1895.

Diagram—Isolation and Disinfection restrict Scarlet Fever in Michigan, in 1895.

Diagram—Isolation and Disinfection restrict Diphtheria, Scarlet Fever, and Typhoid Fever in Michigan (9 and 6 year period.)

Diagram—Isolation and Disinfection restrict Measles in Michigan, in 1895.

Diagram—Isolation and Disinfection restrict Typhoid Fever in Michigan, in 1895.

Diagram—Alleged Nuisance at Six Lakes, Mich.

Diagram—Isolation and Disinfection restrict Measles in Michigan, 6 years, 1890-95.

Diagram—Case-mortality rate from Measles at the different Ages.

Immigrants Exposed to Contagious Diseases and Destined to Settle in Michigan.

During the second quarter of 1897, from time to time, notices were received at this office from Dr. J. H. Senner, U. S. Commissioner of Immigrants at New York City, relative to measles which occurred on board 10 steamships, measles and diphtheria on board one steamship, and small-pox on board one steamship, arriving at that port, and having on board passengers destined for points in Michigan. As soon as these notices were received, copies were mailed to the health officers of the several places of destination, as follows:—

Steamship.	Date of arrival.	Disease on board.	Notices sent to the health officers of:
Majestic.....	Apr. 1...	Measles	Howell, Iron Mountain, Felch Tp., Bessemer Tp., Frankfort.
Werra	Apr. 16...	Measles	Detroit.
Norge	Apr. 18...	Measles	Bay City, Grand Rapids, Detroit.
Lucania	May 1...	Measles	Ishpeming, Iron Mountain, Hancock, Ironwood, Grand Rapids.
Harvel	May 6...	Measles	Calumet.
Fuerst Bismark	May 21...	Measles and diphtheria..	Caseville, Northville, Calumet Tp., Huron Tp., Detroit.
Umbria	May 22...	Measles	Escanaba, Grand Rapids, Manistique.
Phoenicia.....	May 27...	Small-pox.....	Detroit.
Obdam	May 31...	Measles	Grand Rapids.
Paris	June 5...	Measles	Red Jacket, Calumet Tp., Detroit, Gladstone, Sault Ste. Marie.
Barbarossa.....	June 6...	Measles	Crystal Falls, Grand Rapids.
Spaarndam	June 14...	Measles	Grand Rapids.

A notice was also received dated May 4, from the Surgeon of the SS. Lake Superior, which arrived at Quebec, May 4, stating that measles had occurred on board. A copy of this notice was sent to the health officer at Manistee, one of the passengers being destined for that city.

Hektograph Work.

Hektograph work to the amount of 2,797 pages has been prepared, including 1,125 pages of weekly and monthly bulletins, "Health in Michigan;" 376 pages of proceedings of regular meeting; 485 pages of circular letters to observers, relative to sickness statistics in Michigan; about 130 pages of circular letters to members of the State Board of Health; 102 pages of Attorney General's opinion relative to Sec. 2, act No. 167 of the Public Acts of 1883; 80 pages, "Period of Incubation and Duration of Infection"; and about 80 pages, letters to prosecuting attorneys, relative to annual reports of health officers of townships for 1896.

Annual Report of the Health Officers for the year 1896.

During the quarter ending June 30, annual reports for the year 1896, have been received from 150 health officers of townships, 10 health officers of cities and 47 health officers of villages.

During the first and second quarters of 1897, annual reports have been received from 1,086 health officers of townships, 66 health officers of cities and 250 health officers of villages.

At the close of the second quarter of 1897 annual reports were delinquent from 130 health officers of townships, 11 health officers of cities and 45 health officers of villages; a total delinquency of 186 jurisdictions.

A strenuous effort has been made to secure as many of these annual reports as possible. On May 14, 1897, a "Fourth Request for Annual Report Required by Law" was sent to 203 health officers of townships, 15

health officers of cities and 69 health officers of villages; blanks for making the report were also sent to each delinquent officer.

On June 11, 1897, a hektograph letter (No. 1801) was sent to the prosecuting attorneys of 35 counties requesting them to ask the 27 health officers of villages and 8 health officers of cities who either held over or were reappointed, to comply with the law and make their annual report for the year 1896. And on June 11, similar hektograph letters (Nos. 1807 and 1808) were sent to the prosecuting attorneys of 42 counties asking them to urge the 74 health officers of townships who either held over or were reappointed, to comply with the law relative to making annual reports. A return postal card was enclosed with each letter to a prosecuting attorney. To these letters to prosecuting attorneys, 51 replies were received, stating that the complaint had or would have immediate attention. As a result of the complaints to the prosecuting attorneys, 36 annual reports have been received and other reports have been promised.

Compiling, Editing, Proof-reading, Printing, etc.

The work of compilation of data on the meteorological registers from observers of 19 stations for 1896 is well under way. The compilation of annual reports from health officers for 1896, has been made concerning each of the following diseases: Diphtheria, scarlet fever, typhoid fever, measles, whooping-cough, consumption, and typho-malarial fever. The compilation of reports from all sources relative to small-pox in 1895, has been completed and proved; and the compilation of whooping-cough in Michigan in 1895 has been proved. Reports from all sources relative to diphtheria in Michigan in 1896 have been compiled and the compilation partly proved; and the compilation of report relative to scarlet fever in Michigan in 1896 is well under way.

Articles on r  theln, whooping-cough, consumption, and small-pox in Michigan in 1895 have been written and made ready for the printer. Articles on measles and typhoid fever in Michigan in 1895 have been completed and made ready for the printer. The article on nuisances in 1895 and the article relative to injuries and loss of life and property resulting from the use of illuminating oils has been prepared and made ready for the printer.

Proof has been read and some 272 pages of the annual report for 1896 have been printed. It is hoped that early in the next quarter the report for 1896 will be completed.

List of Supervisors in Michigan in 1897-98.

As fast as the names and addresses of supervisors and clerk were returned to the office of the Secretary of State, the lists were borrowed and copied in this office.

Return of Names and Addresses of Health Officers in 1897-98.

There have been returned to this office the names and postoffice addresses of 1,381 health officers of townships, cities and villages. The name and address of each health officer have been recorded in the office, and the return has been placed on file. To each of 520 health officers, who were not health officers last year, was sent a set of leaflet publications of the office on the restriction and prevention of the dan-

gerous diseases and the duties of health officers and local boards of health, two copies of the outbreak report blank, one copy of the weekly report blank, and a sample copy of the blank for use of the health officer in keeping a record of the dangerous diseases.

Distribution of Annual Report, Leaflets, etc.

About 550 copies of the annual report for 1894 and about 200 copies of the annual report for 1895 have been distributed to sanitarians in this and other States. The proceedings of the third annual conference of health officers, the abstract of proceedings of the meeting of the Board in Jan. 1897, and the slip No. 234 relative to lives saved by public-health work, have been sent out to each of 750 sanitarians in this and other States.

At the meeting of the State Medical Society at Grand Rapids, your secretary distributed forty copies of the leaflet No. 226, and 44 copies of the annual report of this Board for 1895.

At the sessions of the Hanover Sanitary Convention, your secretary distributed 75 sets of leaflets and diagrams, 25 copies of leaflet No. 226, and about 110 copies of pamphlet proceedings of sanitary conventions.

In response to special requests of superintendents of school and teachers, 150 school sets and 550 copies of circular No. 226, and 200 copies of circular No. 227, have been sent out from this office.

About the usual numbers of pamphlets on the restriction and prevention of the different dangerous diseases were sent to the health officers of localities in which dangerous diseases have been reported. It was at the same time requested of these health officers that the pamphlets be distributed *to the neighbors of the persons sick with such diseases* and to such other persons as they would be likely to benefit. In response to special requests of sanitarians in this and other states, copies of annual reports, proceedings of sanitary conventions, proceedings of meetings of the board, and pamphlets on the restriction and prevention of the dangerous communicable diseases, have been sent where it was thought likely to benefit public-health interests.

The usual record of distribution of publications has been kept.

The yearly invoice of circulars, paper, and envelopes on hand June 30, 1897, has been taken.

Accessions to the Library, Card-Cataloguing, etc.

About 142 books and pamphlets, and some 300 numbers of journals (weeklies, monthlies and quarterlies) have been received, mostly in exchange for our publications, and entered in the library accession book.

Some work has been done on the card-catalogue of the library.

The usual work in connection with the financial accounts of the office has been done.

Reprinting Leaflets, Diagrams, etc.

In April 2,000 copies of the two-page leaflet, with plate (816) "Isolation and Disinfection Restricted Diphtheria in Michigan in 1894" on one side, and plate (815) "Isolation and Disinfection Restricted Scarlet Fever and Diphtheria in Michigan during the eight years, 1887-94" on the other side, were printed for distribution.

In June 2,000 copies of a two-page leaflet, with plate (844) "Isolation

and Disinfection Restricted Measles in Michigan in 1894" on one side and plate (881) "Isolation and Disinfection Restricted Measles in Michigan in 1895" on the other side, were printed for distribution.

Printing of New Leaflets, Circulars, etc. Michigan State Board of Health Exhibit at Tennessee Centennial.

In May the pamphlet relative to the Michigan State Board of Health exhibit at the World's Fair was rearranged and printed into a pamphlet [No. 236] "Relative to the Michigan State Board of Health Exhibit in the Hygiene and Education Building at the Tennessee Centennial Exposition at Nashville, Tennessee, in 1897." The leaflet was printed to the number of 1,500 copies, and 1,000 copies of it were sent to Nashville for distribution in connection with the exhibit of the Board.

Outbreaks of Dangerous Diseases—Special Investigations.

April 9 Doctor Cattermole made an investigation of an outbreak of alleged small-pox at Blissfield, Michigan. The details of the investigation will be found in his written report, and mention of the outbreak will be found on preceding pages of this quarterly report.

Conference of Undertakers, Railroad and Health Officials.

By agreement six representatives of the General Baggage Agents' Association, seven representatives of the National Funeral Directors' Association, and five secretaries of State Boards of Health met at the Hotel Hollenden, Cleveland, Ohio, June 9 to discuss uniform rules and regulations for the transportation of dead bodies which would fully protect the public health. The stenographer's notes of this meeting are on file in this office; on account of their length, it is not deemed advisable to print them in the annual report of this Board. A short statement of the objects and proceedings of this Conference, and a copy of the report to be presented to the National Conference of State Boards of Health at Nashville, in August, 1897, together with proposed new rules, will be found printed in the July Bulletin of the Ohio State Board of Health.

WORK IN CONNECTION WITH SICKNESS STATISTICS.

During the second quarter of 1897, 2,618 blank report, receipt and return postal cards, 217 record books, 230 hektographed and 122 printed circular letters regarding weekly card reports, have been mailed to 265 health officers and regular correspondents; 1,091 weekly card reports have been received and entered on the register; 53 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 110 copies of the hektographed monthly bulletin, "Health in Michigan," were mailed each month. These bulletins have been consolidated for this quarterly report. Work has also been done on the compilation of the weekly card reports of sickness during the year 1896, for the annual report for 1897.

Health in Michigan in the Second Quarter of 1897. Communicable Diseases.

Compared with the preceding quarter (January, February and March), reports from all sources show *measles* to have increased by an average of

fifty-two places per month; *diphtheria* to have decreased by an average of *twenty* places per month; *whooping-cough* to have decreased by an average of *thirteen* places per month; *scarlet fever* to have decreased by an average of *ten* places per month; *consumption* to have decreased by an average of *ten* places per month and *typhoid fever* to have decreased by an average of *seven* places per month, in the second quarter of 1897. *Small-pox* was reported present at the same number of places in the first and second quarters of 1897.

Meteorology at one Central Station, and Sickness throughout Michigan from all causes, Second Quarter of 1897, compared with the Preceding Quarter.

A comparison of meteorological conditions of the second quarter of 1897, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been northwest (instead of westerly), the velocity 1.9 miles per hour less, the temperature 27.26 degrees higher, the rainfall .39 of an inch more, the absolute humidity much more, the relative humidity less, the day and night ozone more, and the depth of water in the observation well at Lansing 7 inches more, in the second quarter of 1897.

Compared with the preceding quarter (January, February and March), the reports from regular observers show a marked increase of measles, intermittent fever and diarrhea, and a marked decrease of pneumonia, influenza and tonsillitis in the second quarter of 1897.

The Weather and the Health in Michigan in the Second Quarter of 1897, Compared with the Average for the Corresponding Quarters in the Eleven Years, 1886-1896.

A comparison of the meteorological conditions of the second quarter of 1897, with the average for the second quarters in the eleven years, 1886-1896, shows that the prevailing direction of the wind was northwest (instead of southwest), the velocity was .5 of a mile per hour greater, the temperature was 2.60 degrees lower, the rainfall was .04 of an inch less, the absolute and relative humidity and the day and night ozone were all less, and the depth of water in the observation well at Lansing was 5 inches less.

Compared with the average in the corresponding quarters in the eleven years, 1886-1896, the reports from regular observers indicate that measles was much more prevalent, and intermittent fever, consumption, diarrhea, pneumonia and erysipelas were less prevalent in the second quarter of 1897.

GENERAL REPORT OF WORK IN THE OFFICE OF THE
SECRETARY OF THE STATE BOARD OF HEALTH
DURING THE FISCAL YEAR ENDING
JUNE 30, 1897.

Much of the work of the Office naturally groups itself under three heads—the collection of information, the compilation and elaboration of information, and the dissemination of information. In the following outline that grouping is adhered to so far as is practicable without repetition.

COLLECTION AND COMPILATION OF INFORMATION.

RETURNS OF NAMES AND POSTOFFICE ADDRESSES OF HEALTH OFFICERS.

There is a local board of health in every township, and in every incorporated city and village in Michigan.

Every local board of health in Michigan is required by law to appoint and constantly have a health officer, and to report his name and address to the Secretary of the State Board of Health at Lansing.

Blanks for the return of the names and addresses of health officers are sent out by the Secretary of the State Board of Health to the local officers about the first day of April, the law (§ 1634 Howell's Statutes) requiring the appointment and return to be made "within thirty days after the annual township meeting in each year."

In the secretary's quarterly report of work done during the second quarter of 1897, printed on preceding pages of this volume, is an account of the collection of this information relative to health officers in Michigan in 1897-98.

In April, 1897, the usual demand was made upon supervisors of townships, presidents and clerks of villages, and mayors and clerks of cities, for the return of names and postoffice addresses of health officers to serve in 1897-98. The circular and blank forms are similar to those printed on pages xiii-xiv of the Report of this Board for 1884. In June, 1897, a second demand was sent to localities from which no return had been made in response to the demand in April. On the outbreak of a dangerous communicable disease in a township, city or village in which no health officer had been reported, a third and even a fourth demand for the appointment of such officer, and the return of his name has been made; therefore the number of health officers returned increases until the close of the year for which such officers are appointed. At the close of the fiscal year ending June 30, 1897, the numbers for townships, cities and villages were stated in the quarterly report of this Office, printed on a preceding page.

Through the systems of reports to the State Board of Health by its corps of correspondents, as well as by the local health officers, and by a systematic searching of the local columns of the country newspapers published in Michigan, the secretary of the State Board often receives information of an outbreak of a communicable disease, and desires to communicate at once with the health officer; but if no health officer has been appointed in that locality, or no return of such appointment has been made, delay occurs, and before the secretary of the State Board can get into correspondence with the delinquent local board of health and a health-

officer can be chosen, the disease may spread widely within or without the limits of the village or township, with unnecessary sickness and loss of life. It should be said, however, that there is an increasing tendency to comply with this law, and local boards now generally act promptly and coöperate cordially with the State Board of Health in its endeavors to prevent the spread of dangerous communicable diseases.

SPECIAL REPORTS RELATIVE TO DANGEROUS COMMUNICABLE DISEASES.

Every health officer is supplied with blanks "L" from this office, for reporting outbreaks of diphtheria, typhoid fever, scarlet fever, small-pox, measles, etc. (dangerous communicable diseases) to the secretary of the State Board of Health, as required by law.

Upon the receipt of the report of an outbreak of such disease, blank "M" for weekly reports during the outbreak, are sent, with a circular letter ("Blue Letter"), also a number of pamphlets containing instructions for the suppression of the disease. These pamphlets are to be distributed to the neighbors of the family in which the disease is, in order to obtain their coöperation with the health officer.

About 2,382 outbreaks of such diseases were thus attended to during the fiscal year ending June 30, 1897.

Later, a blank is sent to the health officer of each such locality for a final report at the close of the outbreak, stating just what was done for the restricting of the disease, and with what result,—the number of cases and deaths, households invaded, what disinfectants were used, what exceptions, and other facts supplying important data for guidance of future efforts.

The facts thus collected are compiled for publication in the Annual Report of the Secretary of the State Board of Health. In this Annual Report will be found the report of such facts relative to the dangerous communicable diseases in Michigan during the year 1896.

SICKNESS STATISTICS, WEEKLY POSTAL-CARD REPORTS OF ALL IMPORTANT DISEASES, IN 1896.

The weekly postal-card reports of diseases, on cards furnished by the State Board of Health, have been received from health officers of cities and villages and other leading physicians in active general practice who contribute this valuable information from different parts of the State. The plan of these weekly card-reports is described and illustrated on the second and third pages of the article entitled "The Time of Greatest Prevalence of each Disease," in Part II. of this volume. When a return of a new health officer was received, printed circulars [81] and [94], demanding the weekly card reports and describing the method of making the same, together with supplies for making the reports, were sent to the health officer.

A list of the observers of diseases for the calendar year 1896, and a compilation of their reports, with a study of the relations of sickness to climatic conditions is printed in the article referred to in the preceding paragraph. The sickness statistics of Michigan, based upon these weekly reports by the leading physicians in the State, are probably the most important sickness statistics in the world.

The sickness statistics are made especially useful for the purpose of studying the causation of diseases, by reason of the excellent system of

meteorological statistics which have been collected during such a long series of years as to make them exceedingly useful for such purposes.

ANNUAL REPORTS BY HEALTH OFFICERS FOR THE YEAR ENDING DEC. 31, 1896.

In January, 1897, a circular [218] was sent to the health officer of each township, city and village in the State, about 1,585 in all, transmitting a blank form [I] for use in making his annual report to this office. This circular was substantially the same as circular [65] which is printed on pages viii-ix of the Report for 1884. Blank form [I], for reports of health officers, is printed in former Reports. With the circular [218] was also transmitted a blank for a copy of a record of diseases dangerous to the public health, similar to the blank which is printed, reduced in size, on page 271 of the Report for 1882.

Where the name of the health officer has not been returned to this office, the blanks were sent to the president of the village, the mayor of the city, or the supervisor of the township, according as the vacancy occurred in a village, city, or township.

ANNUAL REPORTS BY CLERKS OF LOCAL BOARDS OF HEALTH, DISCONTINUED.

Since the change in the law (Sections 1675 and 1676 Howell's Statutes) went into effect, reports of cases of "diseases dangerous to the public health" are not made to the clerk; and, unless it has been impracticable to secure a satisfactory report from the health officer, no demand was made upon the clerk for an annual report.

RETURN OF NAMES OF MEDICAL PRACTITIONERS, DISCONTINUED.

Section 3, of Act 167, laws of 1883, as amended by Act 268, laws of 1887, provides that

"It shall be the duty of the supervisor, at the time of making the annual assessment in each year, to make out a list of all the physicians and each student practicing under the instruction of a preceptor residing within his township, village, ward, or city, with the name, age, sex and color of each and the length of time each has been engaged in practice, and if a graduate of a regularly established and reputable college, the name of the college and the date of graduation. Such list shall be returned by the supervisor to the township, village, or city clerk, and by the clerk recorded in the book in which are kept the records of the local board of health, and annually on or before the first day of January such clerks shall furnish certified lists of the same to the secretary of the State board of health."

The State Board of Health has regularly, about April 1 in each year, sent blanks for the return of names of medical practitioners, to the supervisors of all townships, cities and villages in the State, in order to make it convenient for them to comply with this law. At the close of the year there were sent to the clerks of all townships, cities and villages, blanks on which to report to the State Board of Health the lists of physicians returned by the supervisors. Notwithstanding this effort, the returns have never been complete, in fact they were so incomplete that in 1896 the effort to collect these lists was abandoned.

The change in the law requiring all dangerous diseases to be reported to the health officer was another reason for discontinuing the reports by clerks relative to medical practitioners.

METEOROLOGICAL REPORTS.

A list of meteorological observers for the calendar year 1896, with a statement of what registers were received from each, is printed in this Report. The reports are summarized in an article in this Report on the Principal Meteorological Conditions in Michigan in the year 1896, commencing on page 1 of Part II. The data are of great value for the purposes of studying the causes of diseases. The observations made at the office of the Board, at Lansing, have been summarized weekly, and a copy kept on file in the Office.

DISSEMINATION OF INFORMATION.

PUBLISHED LIST OF NAMES AND ADDRESSES OF HEALTH OFFICERS.

The names and addresses of 1,408 health officers in Michigan, to serve in 1897-98, were collected and recorded in the Office, and the list of these health officers was printed in pamphlet form (Circular No. 239).

DISTRIBUTION OF INFORMATION HOW TO PREVENT AND RESTRICT DANGEROUS DISEASES.

Whenever information was received of the first occurrence of diphtheria, scarlet fever, typhoid fever or typho-malarial fever, measles, whooping-cough, consumption, or small-pox, copies of a document on the restriction and prevention of the disease reported were immediately sent to the health officer, with a request that he distribute them where they will be likely to be read, and it is suggested that the neighbors of those families in which the sickness occurs would be most likely to read them at such times of danger; and it is thought that after reading them they will be most likely to cooperate with the local health officer for the restriction of the diseases. Thousands of pamphlets on each of the most dangerous communicable diseases are distributed by the State Board in this manner—in localities where the disease treated of in the pamphlet is present. They are being distributed in this way all the time, because there is no time when the State is free from scarlet fever or diphtheria, these being among the most important of the dangerous communicable diseases in Michigan. Copies of the documents on diphtheria, scarlet fever, and small-pox, in German or in Dutch, are also sent when it is thought they can be used to advantage. Owing to frequent requests for documents in French, Polish, Swedish, and Danish-Norwegian, translations of a leaflet on contagious diseases [47] have been made into each of these languages, and copies are sent to local boards of health when requested.

A record is kept of reports received, and of correspondence relative to each outbreak of a dangerous communicable disease of which the Office receives information. A compilation of such information relative to several of the most important diseases is published in this volume.

PRINTING AND DISTRIBUTION OF THE SECRETARY'S ANNUAL REPORT.

Comparatively few copies of the Annual Report of the Secretary are published. The whole number published is not as large as the whole number of officers and members of local boards of health in Michigan. Only about six thousand copies of the Reports are published for all pur-

poses. Only a little over half (3,500 copies) of these are at the disposal of the State Board of Health. These reports are used in exchange with sanitary journals, with other State Boards of Health, with city boards of health in other States, and with health officials in other countries, with libraries, and to physicians in Michigan who contribute to the work of the Board. Michigan is a great and prosperous State, and it is believed that it is made richer, not poorer, by the influences exerted by the publications of the Michigan State Board of Health. But it is believed that better use would be made of the Reports if they were all placed at the disposal of the State Board of Health. As the law now is many of the Reports are wasted by being sent to the offices of county clerks, from which it is alleged that some of them are not taken except as waste paper.

PRINTING AND REPRINTING LEAFLETS, PAMPHLETS, DIAGRAMS, ETC., OF INFORMATION.

During the fiscal year ending June 30, 1897, a quarterly statement was made relative to printing and reprinting leaflets, pamphlets, diagrams, etc.; it will be found printed in the secretary's quarterly reports of work in the office.

INSTRUCTIONS TO NEWLY-APPOINTED HEALTH OFFICERS.

As fast as the names and addresses of health officers to serve in 1897 and 1898 were received, a copy of the pamphlet [120] detailing the duties of health officers, was sent to each one who had not served during the preceding year, together with blanks "L" for the prompt report of any dangerous communicable diseases, and sample copies of pamphlets on the restriction and prevention of diphtheria, scarlet fever, typhoid fever, measles, whooping-cough, and consumption; also a slip [224] relative to consumption being a dangerous disease and short statements relative to its prevention and restriction; and a leaflet [226] on the "Restriction and Prevention of Dangerous Communicable Diseases." Several leaflet diagrams among which were two, one exhibiting the experience in Michigan in 1893 and 1894, in restricting scarlet fever, the other exhibiting the experience in restricting diphtheria during the years 1893 and 1894. The pamphlet containing the laws relating to the public health which were in force in Michigan in 1890 was so nearly out of print that it was not sent, except in exceptional cases.

HEALTH BULLETINS, WEEKLY AND MONTHLY, AND QUARTERLY REPORTS.

The weekly reports of diseases received up to Wednesday of the week following the week for which they are made, are compiled on that day, week by week, and a bulletin, based on that compilation, is sent to each member of the State Board of Health, and to others interested in keeping a "finger on the public pulse"; also to a number of newspapers, and to sanitary and medical journals. A specimen of this weekly health bulletin can be found on page xii of the Report for 1884, and on page lxxxix of the Report for 1894.

This subject of dissemination of information by means of bulletins is treated of in the article on "Time of Greatest Prevalence of each Disease" in Part II. of this volume, commencing on page 86.

Beginning with the month of August, 1884, a *monthly* health bulletin has been issued immediately after the close of each month, for the use of

members of the State Board of Health and others who are studying the subject. These bulletins are mailed to sanitary and medical journals. Beginning with the bulletin for the month of September, 1889, a third column was added, being the average for the bulletin month in a preceding series of years, beginning with the year 1886. This enables the reader to study and compare the prevalence of each disease in the last preceding month with the same disease in the corresponding month in the preceding series of years. An example of this form of bulletin is printed on pages xlv-xlvi, of the Report for 1890, and on pages xcii-xciii of the Report for 1894.

At the close of each quarter these monthly bulletins are consolidated for the secretary's "Quarterly Report of work in the Office, and statement of the conditions of health generally in Michigan", comparing the communicable diseases during the quarter just closed with the preceding quarter, to learn their increase and decrease; including also the meteorological conditions, and the sickness from all causes compared with the preceding quarter and with the average for corresponding quarters for the series of years beginning with 1886.

Beginning with January, 1890, and ending with February, 1891, a supplementary bulletin was prepared representing graphically the relative amount of sickness from each of the principal diseases in the month for which the bulletin was issued. This was sent with the regular monthly bulletin for the same month. A sample of this graphic bulletin is printed on page xlvii of the Report for 1890, and one is printed on page 85 of the Report for 1891.

DIAGRAMS OF INSTRUCTIVE EXPERIENCE IN MICHIGAN.

Two diagrams, "Isolation and Disinfection Restrict Diphtheria," and "Isolation and Disinfection Restrict Scarlet Fever" have been printed, and many hundreds of them distributed as heretofore mentioned. They exhibit, in a condensed form, the experience of the health officers in Michigan, with these two important diseases, relative to scarlet fever in 1894 and 1895, and diphtheria in 1894 and 1895. The evidence in them is similar to that in similar diagrams which have been published for other years; therefore the evidence gains greatly in strength. They prove that in those localities in which isolation and disinfection are enforced the deaths from scarlet fever and diphtheria are only about one-fifth as many as there are in localities where these measures are not enforced.

ABSTRACTS OF PROCEEDINGS OF MEETINGS OF THE STATE BOARD.

Abstracts and brief accounts, of the proceedings of meetings of the State Board of Health are prepared, hektographed or printed, and distributed as soon as practicable after the meeting. During this year, however, because of lack of means, not any of these abstracts were printed in pamphlet form. (Abstracts of the minutes of meetings are printed on preceding pages of this Report.) The distribution of these abstracts is not the same for all meetings, being to different classes of persons, according to the nature of the contents, in some instances being sent to sanitary and medical journals, in other instances to teachers, health officers and others.

SECRETARY'S QUARTERLY REPORTS OF WORK IN THE OFFICE.

At the close of each quarter, the secretary prepares a brief report of the work done in the office. This report is presented and portions of it generally read at the next regular meeting; and, if the abstract of the proceedings of the meeting is printed, this report is printed in the same pamphlet.

REPRINTS.

Reprints of articles in the Report and in proceedings of Sanitary Conventions, have been made in pamphlet form, and sent in answer to queries, in letters, that can best be answered in that manner. For instance, many reprints of the article relative to alleged nuisances in the preceding year have been thus sent out, in response to questions.

REPORTS OF COMMITTEES, DELEGATES, ETC.

QUARTER CENTENNIAL OF MICHIGAN STATE BOARD OF HEALTH.

At the meeting of the State Board of Health, October 9, 1896, Dr. Baker presented the subject of a quarter-centennial celebration of the establishment of this Board. At the meeting of the Board January 8, 1897, he read a report as follows:—

At the regular meeting of this Board Oct. 9, 1896, the secretary was made a committee to report a plan for an appropriate celebration of the twenty-fifth anniversary of the establishment of this Board, which shall occur July 30, 1898. Because of pressure of many duties, your secretary has been unable to report a full plan at this meeting, but respectfully presents the following report of progress, and suggestions for consideration, with a view to receiving further instructions before completing the plan.

The establishment of the State Board of Health by the legislature of Michigan was a movement of such extreme importance, both to the physical and to the pecuniary welfare of the people that it seems eminently proper to celebrate the completion of the first quarter century of the work of the Board, and to do so in a way which will tend to advance the purposes which the legislature had in view in establishing the Board, namely the promotion of the public health, the lessening of sickness, and the prevention of premature deaths, among the people of Michigan.

That such a celebration can be planned and successfully held as will materially advance these purposes, there can be no doubt. It can be done even if the attendance is limited to persons living in Michigan; because the public-health work planned and perfected here in Michigan during the existence of the State Board of Health has been so successful that if only that work shall be studied, exhibited and prepared to be placed before the people of this State in graphic forms, it cannot fail to stimulate further effort and a great increase in the effectiveness and thoroughness of public-health work, and a consequent lessening of sickness and deaths in Michigan. But there is no good reason why the celebration should be restricted to residents in Michigan. The health officials of other States and of the U. S. Government should be invited to come and enjoy the benefits of the work accomplished in Michigan, and to study the methods, in order to carry to their several States and stations whatever is practi-

cable for them to copy with advantage. And they should be invited to bring to the celebration every method elaborated in their States likely to prove useful for the promotion of the public health in Michigan.

Such a meeting could not well fail of accomplishing something which should save a human life in Michigan, and may be confidently expected to do much more than this. In order to induce as many as possible of the active workers in public-health administration to be present, an effort should be made to have the annual meeting of the National Conference of State Boards of Health occur in Michigan at the time of the celebration. Perhaps the American Public Health Association may be induced to hold its annual meeting in Michigan. An invitation should be extended to the Surgeon General of the U. S. Army, who is an eminent sanitarian, and ex-president of the American Public Health Association; also the other U. S. officials laboring for or interested in public health subjects. Prominent sanitarians not in official positions should be invited.

Statistics, recently published, relative to England and to certain States in this country, make it seem important that such a meeting of vital statisticians and sanitarians as it is proposed that the Quarter-Centennial of the Michigan State Board of Health shall be held as soon as proper arrangements can be made; because those statistics make it appear to be possible that the important business of life insurance may soon be threatened, and that those who have charge of the immense money interests of the leading companies should study the subject anew, and possibly make provision for unexpected losses on insured lives at the older ages, otherwise it is possible that serious failures may result. The statistics are not yet complete enough to determine whether the increase in the mortality at the older ages is due to the prolonging of lives through the period of productive labor, and a consequent increase in the proportion of the inhabitants at the older ages, or whether the increased mortality at the older ages is due to the causes suggested by one sanitarian, Dr. Abbott, of Massachusetts. The increased mortality at the older ages is caused by apoplexy, paralysis, insanity, diseases of the brain, kidneys, lungs and heart, the last-mentioned probably being caused by rheumatism; Dr. Abbott has suggested that some of these diseases "are largely favored, and the number of their victims increased by the rush and turmoil attendant upon the aggregation of population into dense communities, by the hurry of business life, and the sharp competition in different trades and industries, by excitement and worry, and by the increasing use of narcotics and stimulants."*

Whatever the cause or causes it is important that they be ascertained, and there should be concert of action among the workers throughout this country to learn the facts as soon as possible in order that proper actions may be taken for the removal of those causes and the restriction or lessening of those diseases. Such a meeting as the one proposed could be made the occasion of the bringing together of the results of studies of this subject by the leading statisticians and sanitarians in this country; and not only advance our knowledge on this subject, but also on the more important subject of better measures for the restriction and prevention of consumption and other most important diseases.

If both the National associations mentioned should decide to meet in Michigan at that time, it is a question whether so many people could be

* The Medical Examiner, Dec. 1896, p. 229.

well accommodated in Lansing; but if not, there is in Detroit an organization for the purpose of inducing associations to meet there, and the Quarter-Centennial Celebration could be held in that city.

The outlook is so promising of results useful for the saving of life and of money values in Michigan, that it seems to me that it is our duty to make the necessary efforts for the holding of such a meeting, and for making it in every way successful.

HENRY B. BAKER,
Special Committee.

At the meeting of the Board January 8, 1897, the following communication was presented and read by the Secretary of the Board, and the preparation of the proposed publication was authorized. The communication reads as follows:—

STATE BOARD OF HEALTH.
MICHIGAN.

OFFICE OF THE SECRETARY.
Lansing, Sept. 15, 1896.

To the President, and Members of the Michigan State Board of Health, Lansing, Mich.:

Gentlemen:—I hereby respectfully ask that permission be granted for me to compile (under the direct supervision of the Secretary and in office hours when not otherwise engaged) a comprehensive statement relative to “A Quarter Century of Public-Health Work in Michigan”; to be printed in pamphlet form, as a supplement to the annual report of the Board, and ready for distribution sometime before Dec. 31, 1898.

It is thought that such a publication can be made to include a complete history of the Michigan State Board of Health, its personnel, its work, and the results of its work, covering a period of twenty-five years; July, 1898, being the twenty-fifth anniversary of the Board. It is thought that such a publication can be made into a neat, attractive and valuable pamphlet *monograph* which will be for the Board, but not *by* the Board, and can be sent out “complimentary” to many places where it will benefit future public-health work.

While no definite plan can now be outlined, it is thought that a comprehensive statement can be prepared which will give in detail the Michigan methods.

Very respectfully,

THEO. R. MACCLURE
Chief Clerk.

The following concurrent resolutions were adopted by the Michigan Legislature of 1897:—

QUARTER-CENTENNIAL CELEBRATION

OF THE ESTABLISHMENT OF THE

MICHIGAN STATE BOARD OF HEALTH.

Concurrent Resolutions Adopted by the Michigan Legislature of 1897.

Whereas, On the thirtieth day of July, 1898, the Michigan State Board of Health will have been established twenty-five years, and the appropriate celebration of the event may be made to promote those interests of the people of Michigan for which that board was established.

Resolved by the House (the Senate concurring), That the State Board of Health is hereby authorized and requested to prepare accurate comparative statements

of the conditions affecting the public health, and of the actual conditions of health in Michigan before and since the establishment of the board, especially exhibiting, if it be true, that there has been a very marked improvement in the healthfulness of Michigan in recent years, and statements of the principal dangers to life and health at the present time, also an appropriate program for a public meeting for the discussion of measures for the further promotion of the public health in Michigan, the meeting to occur on or about the time of the completion of the twenty-five years of the existence of the board.

Resolved further, That the Governor is hereby authorized and requested to send to the National Conference of State Boards of Health, at its coming meeting in 1897, which is to be held in Nashville, Tennessee, during the centennial exposition, an invitation for the National Conference of State Boards of Health, to hold its next annual meeting in Michigan in the summer of 1898 to aid in celebrating the quarter-centennial of the establishment of the Michigan State Board of Health.

Resolved further, That the Governor is hereby authorized and requested to invite to this Quarter-centennial meeting, Surgeon-General Sternberg of the United States Army, Surgeon-General Tryon of the Navy, Surgeon-General Wyman of the Marine Hospital Service, D. E. Salmon, M. D., of the Bureau of Animal Industry, U. S. Department of Agriculture, the officers and members of other State Boards of Health, and of the boards of health of the principal cities in the United States, and other distinguished sanitarians in this and neighboring countries.

Resolved further, That, in case the invitations are accepted, the Railroad Commissioner and the State Board of Health are requested to act, and to coöperate with interested citizens so far as practicable, for facilitating the attendance of representative excursionists from other States, and for placing before those who may visit Michigan on that occasion, the beauties of the numerous delightful summer resorts around the shores of the Great Lakes, and at the numerous inland lakes and other sanatoria, the general healthfulness of the State, and the unparalleled advantages of Michigan as a summer resort State.

Resolved further, That the local boards of health in Michigan be requested to send delegates to this proposed quarter-centennial meeting, in order that they may contribute, for the general welfare of the State, and that they may gain any information which they can for the use and benefit of the public health in their respective localities.

WILLIAM D. GORDON,

Speaker of the House of Representatives.

THOMAS B. DUNSTAN,

President of the Senate.

Approved June 2, 1897.

H. S. PINGREE,

Governor.

PUBLIC HEALTH LEGISLATION IN MICHIGAN IN 1897.

The following is a copy of the special biennial report of the State Board of Health to the outgoing and incoming Governors. It thus gives the outgoing Governor an account of what has been done that he may commend and suggest future work, and gives the incoming Governor an account from which he can formulate any recommendation he may deem wise. The biennial report reads as follows:—

SPECIAL BIENNIAL REPORT OF THE STATE BOARD OF HEALTH

Relative to Public-health Laws and Proposed Legislation in the Interests of Public Health.

To the Present Governor and to the Incoming Governor of Michigan:—

Although not required by the letter of the law, public policy dictates that the results of the observations and studies of the State Board of Health, so far as they relate to imperfections in existing laws relating to the public health, or to proposed amendments of those laws, be placed before the retiring Governor and incoming Governor, to the end that in case either of those officials deems it best, convenient opportunity may thus be afforded to bring to the notice of the legislature any such propositions which seem to be for the public good. Accordingly, this special report by the State Board of Health is respectfully submitted.

The State Quarantine Law,—Act 47, 1893.

At the present time, no unusual sickness or mortality is being experienced in Michigan. None is seriously threatened. The State Quarantine Law (Act 47, Laws of 1893), to enable the Governor and the State Board of Health to do certain acts in an emergency, has been acted under a few times during the past two years, with results which have been very satisfactory to this Board and to the people of threatened localities.

Because of the lessened immigration, and because of other conditions, no occasion has seemed to call for such action, under that law, as the inspection of immigrants or travelers at the State line, to keep out dangerous infection. If occasion had demanded such action, it is not probable that it could properly have been taken successfully, for the reason that the law is not so framed as to be useful for that purpose, the State Supreme Court having decided (102 Mich., page 248) that such rules as, in the opinion of the State Board of Health, are required to make the law of use for the purpose of excluding infection from entry into the State, cannot be made and enforced by the State Board of Health. If the people of Michigan wish to provide for an emergency when they are to rely upon the State quarantine law to protect from danger of cholera, small-pox, or any other dangerous disease being brought into the State by immigrants or travelers, further legislation is necessary.

As before suggested, that law is very useful, from time to time, for the investigation of outbreaks within the State of dangerous diseases which may threaten to spread.

Some of the reasons why the present law (Act 47 of 1893) is not useful, for one of the main purposes for which it was enacted, are stated on pages xcvi-xcviii of the Annual Report of the State Board of Health for the year 1894, and on pages lxxvi-lxxvii of the Annual Report for the year 1895.

Proposed Amendment of Law Relative to Vital Statistics

The law establishing the State Board of Health says: "They shall especially study the vital statistics of this State, and endeavor to make intelligent and profitable use of the collected records of deaths." This has been done, and the statistics have been found valuable; but their value and usefulness would be very much greater if the law were so amended that the records were made immediately after the occurrence of the deaths, instead of postponing the making of the first record, as is now done, until a year or more has elapsed. In his Annual Report on this subject, the Secretary of State, under whose direction the mortality statistics are collected and published, has recommended the amendment of the law; the chief of the division of vital statistics has drawn a bill which has been considered by a committee of the State Medical Society, by a committee of the State Conference of local health officers, and by a committee of the State Board of Health, all of which organizations have recommended the amendment of the law, and it is hoped that the law may be amended at this coming session of the legislature.

State Hospital for Consumptives.

Although consumption is now well known to be a dangerous communicable disease, and one which among intelligent and well-to-do people is one of the easiest diseases to restrict—by the careful destruction of the infectious sputa—yet that disease still continues to destroy more people in Michigan than does any other disease. The State Board of Health has long recognized the fact that it can never be avoided by the most intelligent and most conscientious classes of our people so long as the ignorant and poor people afflicted with that disease are permitted and by circumstances are forced to continue to infect crowded work-shops, factories, schools and public places. The law requires cases of dangerous communicable diseases to be reported to the local health officer. An important question is what shall be done relative to those consumptives, of both sexes, who, when reported, are found at that stage of most danger of spreading the disease, whom circumstances require to continue to labor, and who have not been taught and who cannot easily be taught how to avoid spreading this most fatal disease to others?

Previous to the last session of the legislature, the State Board of Health had given this subject much consideration. It was considered by the State Conference of local and State health officials, at Ann Arbor in 1894, and resolutions *unanimously* adopted as follows:—

"*Resolved*, That it is the judgment of this Conference of Health Officers and other delegates of Michigan Boards of Health, that consumption (and other diseases due to the *Bacillus tuberculosis*) should be included in the list of 'Diseases dangerous to the public health,' referred to in Secs. 1675 and 1676 Howell's Statutes, requiring notice by householders and physicians to the local health officer, as soon as such a disease is recognized.

"*Resolved*, That we recognize the following facts:

"1. That tuberculosis is the most grave and fatal disease now affecting the health and lives of the people of this State, destroying about three thousand lives per year;

"2. That this disease originates principally by transmission from man to man or from man to animals and again to man;

"3. That the spread of this disease can be best arrested by the disinfection of the sputa and other discharges, by special supervision of those infected, and by the care of such persons under conditions which will prevent the transmission of the disease to others;

"4. That such disinfection and supervision cannot be carried out in the crowded houses of the poorer classes; and

"5. That, under conditions which will prevent reinfection, many consumptives may be permanently cured, and return to their homes and work, educated in the methods of restricting the disease. In view of these facts;

"*Resolved*, That this Conference, by its officers, respectfully memorialize the next Legislature for an appropriation sufficient for the purpose of building, equipping and maintaining a State Hospital for Consumptives.

"*Resolved*, That the planning, construction and equipping of the State Hospital for Consumptives may well be entrusted to the State Board of Health.

"*Resolved*, That the location of the Hospital should be such that it may be accessible by railroad to the thickly-settled parts of the State, and such as to permit of out-door exercise and light out-door labor whenever the weather will permit.

"*Resolved*, That although consumption is the most dangerous communicable disease, a hospital can be so planned, equipped and managed as that it shall not seriously endanger the neighboring inhabitants; and as it is desirable that it shall contribute the largest amount of sanitary education to the teachers and to the people of the State, therefore,

"*Resolved*, That it is the judgment of this Conference that the proposed State Hospital for Consumptives should be located at the seat of the State University at Ann Arbor, in order that it may afford the best opportunities for the observation and study of this most important disease, in conjunction with the investigations now being so satisfactorily pursued in bacteriology and other departments of sanitary science, at the State Laboratory of Hygiene.

"*Resolved*, That this Conference hereby respectfully memorializes the Legislature of Michigan at its next session to take such action as will result in a knowledge of the extent to which the dairy cattle and other animals supplying milk, meat or other food products to the people of Michigan are infected with tuberculosis. Also that it take such action as will tend to stop the spreading of tuberculosis among animals, and from animals to man."

Pursuant to this action, the State Board of Health carefully prepared a bill to establish a State Hospital for Consumptives, and the bill was introduced into both houses of the legislature, it being "Senate bill 433" and "House bill 828." Neither of these bills was given any consideration whatever by the legislature. A copy of the bill is printed on pages xxviii-xxx of the Annual Report of the State Board of Health for 1895.

The question which the State Board of Health wishes to have placed before the present legislature is: Is general poverty and "hard times" a valid reason for not considering a plan designed to lessen, among the people generally, one of the most common causes of poverty and "hard times," namely that most general disease which causes most deaths and most prolonged and expensive sickness and disability for productive labor?

The Regulation of the Practice of Medicine.

At the present time, any person taken suddenly too ill to dictate what physician shall be employed, is liable to be placed in the care of some pretender who holds himself out as a physician. When able to select a physician, people generally have no way whereby they can well judge of the extent of the education and skill of those who appear to be

physicians. Lawyers are not permitted to take charge of the legal interests of the people, which, usually, relate only to pecuniary affairs, except that they shall first pass an examination tending to show them to be qualified for such duties. Physicians deal always with the interests of life and health; yet in Michigan the legislature has not provided for guarding those great interests as well as it has those interests connected with legal controversies.

Recently systematic effort has been made by so-called medical colleges in adjoining States to induce persons in Michigan to purchase diplomas, so that they may register as physicians under the present very imperfect law. Numbers of persons who were not qualified to practice medicine have applied to the county clerks, and in some instances have been permitted to register and enter upon practice as physicians, upon the claim that they were entitled to do so because of such diplomas purchased without their having attended any medical college.

The public health suffers, in many ways, through the ignorance of those who assume to practice medicine: (1) The health and life of persons who come under the care of unqualified physicians are endangered by their ignorance. (2) Dangerous communicable diseases occur in their practice, and such doctors fail to recognize and report them to the local health officer, the disease is not restricted, and unnecessary sickness and loss of life results. (3) Such medical practitioners do not realize the importance of many of the subjects on which the State Board of Health advises the people, consequently they fail to coöperate for the restriction and prevention of diseases. (4) Some of these unqualified persons are chosen as health officers, and thus the health interests of whole communities are jeopardized.

The present law—Act 167 of 1883, as amended by Act 268 of 1887—permits any person to practice medicine in Michigan who is a “graduate of any legally authorized medical college in this State or any (one) of the United States, or in any other country.” As medical colleges located in adjoining States and claiming to be “legally authorized” advertise extensively in Michigan, and thus induce many unqualified persons to purchase diplomas without attendance at such “colleges,” the law is not a sufficient protection. Another serious defect in the law is that it leaves with the several county clerks the decision of who are graduates of legally-authorized medical colleges, and these officers are unable to obtain the necessary information.

The law should be amended so as to require one State commission or board with a central office at the State Capitol to collect the facts which will make it possible to decide not only who are graduates of legally authorized medical colleges, but also who are properly qualified to be entrusted with the health and lives of citizens of Michigan. The law should not permit the registration of any physician except after examination of the physician, or of his diploma and positive knowledge of the standing of the medical college which granted his diploma.

It is probable that the philanthropic medical profession of the State would willingly contribute, as re-registration fees, sufficient money to carry out the provisions of a good law on this subject. Or those hereafter admitted to practice may be made to meet the expenses. But in the opinion of this Board this subject is of sufficient importance to the people of the State to warrant the expenditure of the public money necessary to secure protection from the present evils.

It is the belief of the State Board of Health that the supervision of the registration of physicians should not be required of the State Board of Health, whose members are and should be selected for important duties requiring knowledge, experience and studies in sanitary science, public-health administration, and the prevention of sickness and deaths, qualifications very different from those required in judging of the qualifications of physicians for the cure of disease, or for the surgical treatment of maladies and injuries.

There should be a State Medical and Surgical Board, appointed by the Governor and Senate, having its office at the Capitol, and having at least one paid official constantly on duty. Money losses will thus be prevented more than sufficient to meet the expense; and life and health in Michigan will be more secure.

For the Restriction and Prevention of Disease, Educational Work, to Secure the Co-operation of the People, is Necessary.

Experience has proved that for the successful restriction or prevention of the dangerous diseases, the coöperation of the people themselves is requisite, and the people themselves must know what diseases are communicable, how they are spread, and the best measures for their restriction. For many years, the State Board of Health has systematically aided local health officials to restrict dangerous diseases, by supplying to the neighbors of the infected premises information necessary to enable them to coöperate with the local health officers. The official reports to the State Board of Health, and the mortality statistics collected and published by the Secretary of State agree in proving that there has been a very great saving of human life in Michigan while this work has been done, compared with the death-rates when it was not being done. The evidence is that more than a thousand lives per year have been saved, and thousands of cases of sickness avoided, involving a saving to the people of this State of money values exceeding a million dollars per year. This work by the State Board of Health has grown, more diseases are dealt with than formerly, and the appropriations for the use of the Board are now inadequate to do the work.

Another method of education of the people for their coöperation in public-health work has been by means of the Sanitary Conventions for which, together with several other purposes, a small annual appropriation (\$2,000 per year) has been made. The other purposes specified in the law have so encroached on the fund as to leave very little for the Sanitary Conventions, and this Board deems it for the public good that more such conventions be held than it has been found possible to hold heretofore.

The legislature in 1895, by Act 146, required the State Board of Health to send to all school teachers in the State data and statements to enable them to teach the modes of spreading and the best means of restricting the dangerous communicable diseases. No appropriation has been made for this additional work. This Board considers this law to be of the utmost importance, and for the first year complied with it as fully as possible. In doing so, however, no money was left with which to meet the expenses of the Sanitary Conventions, and of other lines of work required of the Board.

The State Board of Health believes that the best interests of the people will be subserved by the making of a small appropriation, not exceeding

ten thousand dollars per annum, for the general purposes for which the board exists, including the fulfillment of Act 146 of 1895, and other laws.

It seems certain that the appropriations already made for and used by the Board have been returned to the people many fold, in money values saved. It is believed that the additional appropriation here asked for will yield equally valuable returns.

Respectfully submitted, by direction of the State Board of Health.

FRANK WELLS, *President.*

HENRY B. BAKER, *Secretary.*

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, {
Lansing, Michigan, Dec. 11, 1896. }

The following act was passed by the Legislature of 1897:—

ACT NO. 43, LAWS OF MICHIGAN, 1897.

An Act to provide for the Analysis of Water in Use by the Public in Certain Cases.

SECTION 1. *The People of the State of Michigan enact.* That in any case where any city, village or township in this State shall be supplied with water for domestic uses by any individual, company or corporation, city or village, or where there is within such city, village or township, any water in swales, wells, rivers or other places, which might be the cause of disease or epidemic, a sample of such water may be sent to the University of Michigan for analysis by the mayor of such city or village, or the president of such village, or by any alderman or trustee of such village, or by the supervisor of any such township, upon the resolution of the common council of such city, or board of trustees of such village, or the township board of such township, for that purpose duly passed.

SEC. 2. Upon receipt of such sample the regents of the University of Michigan shall cause a correct analysis of such sample of water to be made and a correct statement of the properties contained therein, with a further statement whether or not such sample contains any substance deleterious to health, and return such analysis together with the statement aforesaid to the person so sending the same, free of charge except the actual cost of materials and animals used in making such analysis and experiment.

SEC. 3. It shall be the duty of the board of regents of the University of Michigan to cause a record to be kept of every sample of water received under and by virtue of this statute, and in no case shall a second analysis be required of the same water within one year, except in case of the breaking out of some disease among the consumers of such water, and then only upon the certificate of at least two physicians engaged in active practice in that community that in their opinion such disease arises from the use of said water.

Approved March 26, 1897.

The Legislature of 1895 enacted a law requiring the teaching in the public schools the subject of the modes of spreading and the best methods for the restriction and prevention of the dangerous communicable diseases. The law requires that the State Board of Health shall supply the "data and statements" which enable the instructors of the State to teach the subject required by Act 146, laws of 1895; but the act did not provide the necessary appropriation with which to carry out the provisions of the law. However, the State Board endeavored to comply with the law and did do so, thinking that the bills for such expenditures would be audited by the Board of State Auditors. The bills were disallowed by that Board. Accordingly, the State Board of Health asked the Legislature of 1897 to provide an appropriation to carry into effect Act 146, laws of 1895. The Legislature did provide such an appropriation, in the following act:—

ACT 142, LAWS OF 1897.

An act making an appropriation for the use of the State Board of Health, to enable it to comply with Act one hundred and forty-six of the public acts of eighteen hundred and ninety-five, entitled "An act to provide for teaching in the public schools the modes by which the dangerous communicable diseases are spread and the best methods for the restriction and prevention of such diseases."

SECTION 1. *The People of the State of Michigan enact*, That the sum of two thousand five hundred dollars per annum, is hereby appropriated out of the general fund, to enable the State Board of Health to comply with section one of act one hundred and forty-six of the public acts of eighteen hundred and ninety-five. Itemized bills for expenses incurred under this act shall be audited by the State Board of Health, whereupon the Auditor General shall draw his warrant for the amounts allowed, not exceeding the amount appropriated, and the amounts thus allowed shall be paid from the State treasury.

SEC. 2. The Auditor General shall add to and incorporate with the taxes for each year the amount above appropriated, which, when collected, shall be passed to the credit of the proper fund.

This act is ordered to take immediate effect.

It became a law May 16, 1897.

COUNTY MUST PAY FOR CARE OF INDIGENT PERSONS SICK WITH DANGEROUS COMMUNICABLE DISEASES.

UNDER § 1647 HOWELL'S STATUTES.

Supreme Court Decision.

SUPREME COURT.

Village of St. Johns,

vs.

Board of Supervisors of Clinton County.

On October 31, 1894, the epidemic of smallpox broke out in the village of St. Johns, and the Board of Health, being the trustees of the village, increased the pay of its health officer, Dr. Henry Palmer, one of its members by a further sum of ten dollars a day. Dr. Palmer performed the duties of health officer, with this increased compensation for sixty-nine days, during the prevalence of the smallpox. The village audited and presented to the board of supervisors for allowance a bill of expenses incident to the smallpox, amounting to \$2,810.48. This bill included among its items \$690 as salary to its health officer, and \$150 paid him as compensation in attending certain indigent persons, and being all the indigent patients he attended. These services as physician were rendered during the time he was receiving additional compensation as health officer.

The board of supervisors allowed and paid the whole bill, except the \$690 to the health officer. This it refused to pay, and the village filed a petition for a mandamus in the circuit court for Clinton county to compel its payment. After a hearing in that court, the writ was issued against the board directing the payment of this item.

The case was heard on petition and answer, and the following stipulation of facts made: "It is hereby stipulated that the only questions to be decided in this case are, whether the fact that the health officer was a member of the board of health of the village of St. Johns prevents a recovery by the village; and second, whether the fact that the services for which the bill in question was rendered were performed by the health officer of said village as health officer in preventing the spread of the smallpox and in taking measures for the safety of the inhabitants during the epidemic of smallpox prevents recovery by the village.

"It is admitted that at the outset of the epidemic an agreement was entered into between Dr. Henry Palmer, the health officer, and the board of health of

said village, by which said health officer was to receive at least ten dollars a day over and above his annual salary of \$100 while employed about the smallpox epidemic, and as much more as they should agree upon later. It is also admitted that the bill in question is a reasonable one for the services performed, and that those persons who were sick with smallpox during said epidemic, and their parents, and all others liable for their support, were unable to pay the same, or any part thereof. It is also admitted that the sum of \$690 was allowed by said board of public health to said health officer for said services in and about said epidemic as health officer, and that this sum was over and above the annual salary of \$100 paid to said health officer. The object of this stipulation is not to set forth all the facts, but to limit the issues in the case to the two questions first stated in this stipulation, and thus prevent the framing and trial of issues of fact."

The case comes into this court by writ of certiorari to review the findings of the court below.

Counsel for the board of supervisors contends that the board of health cannot fix the compensation of one of its members, and thus bind the county for the payment of the amount so fixed; and cites:

Kennedy v. Gies, 25 Mich., 83; and
Farnsworth v. Supervisors, 56 Mich., 640.

We think those cases not controlling in the present controversy.

Dr. Palmer was a member of the board; but there is nothing in the record to show that he took any part in the proceedings to fix his compensation, and the stipulation itself recites that the services had been performed, and the bill charged was a reasonable one.

In Farnsworth v. Supervisors, supra, it was said:

"Whether it was competent for the board of health to employ its own members and fix conclusively the compensation to be made by the county is a question of no little importance; but we do not enter upon it here, it being unnecessary to do so."

We should doubt the power of the board of health to fix conclusively the amount of the claim of Dr. Palmer did it appear that he took part as a member of the board in fixing his own compensation, and the board of supervisors were contesting the claim upon the ground that the amount fixed was excessive. But the case presents no such features. It is stipulated that the charges are reasonable for the services performed, and that persons who were sick with smallpox and all others liable for their support were unable to pay the same, or any part thereof.

We think that the second contention of counsel cannot be sustained. Section 1681 b, 3d How. Sts., prescribes the duties of the health officer in case of the epidemic of smallpox, etc., or other communicable disease dangerous to the public, in cities, townships and villages. Section 1681d provides: "In the fulfillment of the requirements of this act, the health officer, unless other provision shall have been made in accordance with law, shall be entitled to receive from the township, city or village of which he is the health officer compensation at the rate of not less than two dollars per day," etc.

The contention of the board of supervisors is that these sections place the burden of payment of the health officer upon the township, city or village.

These sections, however, must be construed with sections 1647-48 of 1st How. Sts. Section 1647 provides: "When any person coming from abroad or residing in any township within this state shall be infected or shall lately before have been infected with the smallpox or other sickness dangerous to the public health, the board of health of the township where such person may be shall make effectual provision in the manner in which they shall judge best for the safety of the inhabitants, by removing such sick or infected person to a separate house, if it can be done without danger to his health, and by providing nurses and other assistance and necessities, which shall be at the charge of the person himself, his parents or other persons who may be liable for his support, if able; otherwise, at the charge of the county to which he belongs."

Section 1648 provides: "If any such infected person cannot be removed without danger to his health, the board of health shall make provision for him as directed in the preceding section in the house in which he may be, and in such case they may cause the persons in the neighborhood to be removed, and may take such other means as they may deem necessary for the safety of the inhabitants."

Section 1681 imposes the same duties upon the boards of health of cities and villages as are imposed by sections 1647-48 of 3d How. Sts. upon boards of health of townships. These sections make it the duty of boards of health to prevent the spread of the disease and to do whatever such boards may deem necessary for the safety of the inhabitants.

The services rendered by Dr. Palmer were in the line of his duty. Prior to the epidemic his salary had been fixed at \$100 per annum. When the epidemic commenced, the board of health of the village directed him to prevent so far as possible its spread and to take care of those infected. For these services he was to be paid the sum of ten dollars per day over and above the amount of his salary. This expense was rendered necessary by reason of the epidemic; and we think are charges which the county became liable to pay under the provisions of sections 1647-48. While the boards of health of townships, cities and villages are required to fix and pay the ordinary services of the health officer, yet it is apparent that it was the intent of the legislature by the various provisions of the statute to cast the burden upon the county for extraordinary services rendered to prevent the spread of contagious diseases, and for the care of indigent persons, afflicted with such disease. *City of Clinton vs. County of Clinton*, 16 N. W. R. p. 87.

We think the court below was not in error in directing payment of this bill by the board of supervisors. The order so made will be affirmed.

CHAS. D. LONG,
R. M. MONTGOMERY,
J. B. MOORE,
FRANK A. HOOKER,
C. B. GRANT.

ANY QUACK CAN PRACTICE MEDICINE IN MICHIGAN.

A year or so ago, the Secretary of this Board placed before the Attorney General of Illinois the fact that the "Illinois Health University" was selling diplomas to any person who had the price, and was requiring no qualifications from the candidate. This "University" was legally-authorized under the laws of Illinois, and thus in Michigan its diplomas were practically as good as those of any reputable medical college, and its graduates could legally practice in Michigan. After a number of these so-called doctors had registered in Michigan, the Secretary made complaint to the Attorney General of Illinois—Hon. Maurice T. Moloney. Mr. Moloney succeeded, through the courts of Illinois, in securing the dissolution of the Charter of the Illinois Health University. Soon, however, a college under the same management sprang up in Chicago, under the title of the Independent Medical College, and continued to sell diplomas to ignorant and unqualified persons, and such so-called graduates continued to prey upon the people of the United States.

The Secretary of the Board started on a new tack. Thinking that, as such a college was a recognized and advertised fraud, the county clerks in Michigan would be justified in refusing to register its "graduates," he asked for the opinion of the Attorney General, which was given and reads as follows:—

STATE OF MICHIGAN,
ATTORNEY GENERAL'S OFFICE.
Lansing, June 2, 1897.

DR. HENRY B. BAKER, *Secretary State Board of Health, Capitol, Lansing.*

My Dear Sir:—In compliance with your request for my construction on act No. 167 of the Public Acts of 1883, entitled "An act to promote public health," upon the points raised in a letter to yourself by Dr. B. D. Harrison, Health Officer of Sault Ste. Marie, I beg leave to submit the following:

The question presented is as to whether the duty which is placed upon the county clerk by section 2 of said act is one of a ministerial or of a *quasi-judicial* nature.—If it be one of a ministerial nature merely, it is his duty to follow out specifically the line of conduct marked out for him by that act, and his only duty would be to receive and file the affidavit or sworn statement required to be presented by persons desiring to practice, or practicing medicine and surgery within the county.

If, on the contrary, the duty be of a *quasi-judicial* character, he has a judgment and a discretion confided to him, and may determine as to whether or not the college of which the person presenting the affidavit or sworn statement claims to be a graduate, is a reputable and legally authorized medical college in contemplation of the act under consideration.

It seems clear to me that the duty imposed upon the county clerk by said act No. 167 of the public acts of 1883, comes under the former class, and that the county clerk, in performing the duties imposed upon him by said act, acts as a purely ministerial officer. His whole course of conduct and his duty under the act are clearly and specifically mapped out as follows:—

"It shall be the duty of the county clerk of each county in this State to record in a book to be provided by the county the affidavit (or sworn statement) of every physician practicing in said county. For recording such statement the county clerk shall receive fifty cents, to be paid by the person filing the same."

The office of the county clerk has always been considered as a ministerial office, and the duties exercised by the incumbent of that office have always been purely ministerial, except in those instances in which some discretionary power was vested in him by the terms of some particular statute. It follows, therefore, that, in the absence of some express statute, or a necessary implication from such statute conferring upon the county clerk duties of a judicial or *quasi-judicial* nature, he can not exercise such duties.

The act of determining whether or not a particular medical institution is a reputable medical college, would be a judicial or *quasi-judicial* act,—one in which it would be necessary to exercise a judgment and a discretion. The act in question neither expressly nor impliedly confers upon the county clerk the duty of exercising a discretion in this matter, and in the absence of such power being conferred, the case would fall within the rule above stated, and the county clerk could exercise none but ministerial duties.

The clear intent of the act is that the county clerk shall receive the affidavit (or sworn statement) of every person presenting the same. The county clerk might, it is true, insist that such affidavit (or sworn statement) should contain all of the formal parts required by the statute. In so doing he would be exercising merely a ministerial duty. Further than that, his only duty would be to receive and file the affidavit or sworn statement.

The act furnishes appropriate remedies against persons practicing without having filed the proper affidavit or sworn statement, in the shape of penalties, and these penalties could, and would be applied to physicians who had filed an affidavit or sworn statement which did not comply with the statute, as to those who had not filed any statement: In other words, the filing of an insufficient statement would be equivalent to filing no statement at all. The duties of enforcing the provisions of the act are placed upon the supervisor and health officer of the local board of health of each township, village or city, and it is their duty to see that the statute is fully complied with, rather than the duty of the county clerk to enforce a compliance by refusing to receive the affidavit (or sworn statement) of any person tendering the same.

Yours respectfully,

FRED A. MAYNARD,
Attorney-General.

The Secretary of the State Board of Health respectfully submits to the people of Michigan that the interests of life and health demand that the law in Michigan be so amended that innocent children, and other persons too sick to be able to judge of the qualifications of those who are employed to prescribe for them, shall have some such protection as is afforded to them in other States; and that their lives shall not much longer be at the mercy of ignorant pretenders who swarm into Michigan from other States in which medical practitioners must exhibit qualifications before being permitted to practice. The intelligent, well-educated graduates of the excellent medical colleges in Michigan are being displaced and driven from Michigan by the quacks and diploma-purchasers, to the very great detriment of the public health.

REPORT OF THE SECRETARY RELATIVE TO PROPERTY, ETC., FOR THE FISCAL YEAR ENDING JUNE 30, 1897.

To the President and Members of the Michigan State Board of Health.

GENTLEMEN:—In compliance with Section 5 of Article II of the by-laws of this Board, the following report of the "Nature and amount of property belonging to the Board, which has been received, issued, expended, and destroyed since the last report, and of the property remaining on hand, and also in whose care each item of property is intrusted," is respectfully submitted:—

Preceding reports should enable one to learn the items of property on hand at the beginning of the fiscal year 1897. My last report is printed on pages cxvi-cxxx of the Annual Report for 1896. Since last report, instruments and articles of a similar nature have been purchased as follows:

PHOTO-ENGRAVED PLATES PURCHASED.

One plate—Isolation and Disinfection restricted Scarlet fever and Diphtheria in Mich., 8 years, 1887-94.

One plate—Isolation and Disinfection restricted Diphtheria in Mich. in 1894.

Five plates relating to Weekly Reports of Sickness in Michigan in 1894.

One plate—Movements of Contagium of Diphtheria in 1894.

One plate—Isolation and Disinfection restrict Scarlet fever in Mich. in 1894.

One plate—Lives saved by Public-health work.

One plate—Infant Mortality, and the Death-rate at all ages, and at certain specified Ages and periods of Age, in Mich.

One plate—Distribution of Diphtheria in Mich. in 1894.

One plate—Distribution of Scarlet fever in Mich. in 1894.

One plate—Isolation and Disinfection restricted Diphtheria, Scarlet fever, Typhoid fever, and Measles, in Mich., 5 years, 1890-94.

One plate—Distribution of Typhoid fever in Mich. in 1894.

One plate—Movements of Contagium of Typhoid fever in Mich. in 1894.

One plate—Decreasing death-rate in Mich. per 10,000 inhabitants from Scarlet fever, 1869-94.

One plate—Increasing life saving in Mich. per 10,000 inhabitants from Scarlet fever, 1869-94.

One plate—Reported deaths from small-pox in Mich. in each of the 26 years, 1869-94.

One plate—Decreasing death-rate in Mich. per 10,000 inhabitants from small-pox, 1869-94.

One plate—Increasing life saving in Mich. per 10,000 inhabitants from Small-pox, 1869-94.

One plate—Typhoid fever in Duncan Tp.

One plate—Plan of part of city of Marquette.

One plate—Isolation and Disinfection restrict Typhoid fever in Mich. in 1894.

One plate—Decreasing death-rate in Mich. per 10,000 inhabitants from Typhoid fever, 1869-94.

- One plate—Reported deaths from Typhoid fever in Mich., 27 years, 1868-94.
 One plate—Isolation and Disinfection restrict Measles in Mich. in 1894.
 One plate—Distribution of Measles in Mich. in 1894.
 One plate—Movements of Contagium of Measles in Mich. in 1894.
 One plate—Movements of Contagium of Small-pox in Mich. in 1894.
 One plate—Distribution of Consumption in Mich. in 1894.
 One plate—Alleged Nuisance in Colon Tp., St. Joseph Co.
 Fifteen plates—Relating to the Meteorological Conditions in Mich. in 1894.
 One plate—Outline County Map of Michigan.
 One plate—Average Annual number of reported deaths from Diphtheria per 10,000 persons in Mich., 1892-95.
 One plate—Average Annual number of reported deaths from Scarlet fever per 10,000 persons in Mich., 1893-95.
 One plate—Movements of Contagium of Diphtheria in Mich. in 1895.
 Five plates—Relating to Weekly Reports of Sickness in Mich. in 1895.
 One plate—Isolation and Disinfection restricted Diphtheria in Mich. in 1895.
 One plate—Movements of Contagium of Scarlet fever in Mich. in 1895.
 One plate—Distribution of Diphtheria in Mich. in 1895.
 One plate—Distribution of Scarlet fever in Mich. in 1895.
 One plate—Isolation and Disinfection restrict Scarlet fever in Mich. in 1895.
 One plate—Isolation and Disinfection restricted Diphtheria, Scarlet fever and Typhoid fever in Mich. for a series of years.
 One plate—Movements of Contagium of Scarlet fever in Mich. in 1895.
 One plate—Isolation and Disinfection restrict Measles in Mich. in 1895.
 One plate—Distribution of Measles in Mich. in 1895.
 One plate—Distribution of Typhoid fever in Mich. in 1895.
 One plate—Movements of Contagium of Measles in Mich. in 1895.
 One plate—Alleged nuisance at Six Lakes, Mich.
 One plate—Isolation and Disinfection restrict Measles in Mich., six years. 1890-95.
 One plate—Distribution of Consumption in Mich., in 1895.

PROPERTY LOANED.

Many photo-engraved plates were loaned to Robert Smith & Co., State Printers and Binders, Lansing, to be used in printing Annual Reports and other publications of this Board. Most of these plates have been returned, but a few still remain charged to them on the property loan book of this Office. The plates will probably be returned as soon as the State Printer is through with them.

INSTRUMENTS PURCHASED SINCE LAST REPORT.

- One raingauge-tube. One Pool's ink slab.
 One hard rubber triangle, 13 inch. One hard rubber triangle, 6 inch.

METEOROLOGICAL INSTRUMENTS ISSUED.

One minimum registering thermometer, for use at this office. One maximum registering (to replace one accidentally broken while in use) to E. S. Pettyjohn. M. D., Alma.
 One maximum registering thermometer, one minimum registering thermometer, one dry bulb thermometer, 1 measuring stick for raingauge, to John S. Caulkins. M. D., Thornville.
 One barometer, and box for protection, one dry-bulb thermometer, one wet-bulb thermometer, board, clips, cup, and wick, one maximum, and one minimum registering thermometers, with board, etc., for hanging. One raingauge, with measuring stick, to Edward Cahill, Petoskey.

METEOROLOGICAL INSTRUMENTS RETURNED.

One barometer, and box for protection, one dry-bulb thermometer, one wet-bulb thermometer, board clips, cup, and wick, one maximum and one minimum registering thermometers, with board, etc., for hanging, by J. W. Ash, Ashton.
 One maximum registering thermometer, by E. S. Pettyjohn, M. D., Alma.
 One barometer, and box for protection, one maximum registering thermometer, with board, only.
 One wet-bulb thermometer, board, clips, cup and wick, by Arthur Beebe, Gulliver Lake.
 One barometer, and box for protection, one standard thermometer, one maximum and one minimum registering thermometers, with board, etc., for hanging, one wet-bulb thermometer, board clips, cup and wick, one raingauge, overflow tube, and measuring stick, by C. H. Prentiss, Otsego.

One barometer, and box for protection, one dry-bulb thermometer, one wet-bulb thermometer, board, clips, cup and wick, one maximum and one minimum registering thermometers, one raingauge and overflow tube, by Prof. Charles E. Barr, Albion.

METEOROLOGICAL INSTRUMENTS ACCIDENTALLY BROKEN WHILE IN USE BY OBSERVERS.

One measuring stick for raingauge, by the observer at Tawas City.

One maximum registering thermometer, by the observer at Alma.

Two clips and screw-bolt for registering thermometers, by the observer at Gulliver Lake.

One standard thermometer, by the observer at Otsego.

One measuring stick for raingauge, one maximum registering thermometer by the observer at Albion.

One hard-rubber triangle, 13 inch; one hard-rubber triangle, 6 inch, while in use at this Office.

METEOROLOGICAL INSTRUMENTS AND OTHER PROPERTY ON HAND.

4 Standard barometers (including one in use in this Office).

9 dry-bulb thermometers (including one in use in this Office).

9 wet-bulb thermometers (including one in use in this Office).

5 minimum self-registering thermometers (including one in use at this Office).

6 maximum self-registering thermometers (including one in use at this Office).

1 standard thermometer.

1 standard thermometer for inspecting oils.

6 registering thermometer boards (including one in use at this Office).

12 psychrometer boards (including one in use at this Office).

3 psychrometer cups (including one in use at this Office).

7 minimum thermometer clips.

5 psychrometer clips.

8 screw bolts for registering thermometers.

9 pins for registering thermometers.

3 hooks for hanging barometer.

3 barometer boxes (including one in use at this Office).

1 raingauge tube.

1 raingauge, in use at this Office.

2 caps for overflow tubes.

2 large, galvanized iron pails, to measure snowfall.

1 Draper's self-registering thermometer.

1 new anemometer, in use at this Office.

1 old anemometer, disabled by long use.

2 circular magnifying hand glasses.

3 psychrometer cups, spoiled by rust and long use.

8 psychrometer cups; injured by use, can be repaired.

31 broken thermometers (includes all, since observations have been taken).

1 worn-out anemometer spindle.

1,200 slips ozone test-paper.

1 hard rubber triangle, 13 inch.

1 hard rubber triangle, 6 inch.

1 dotting instrument.

1 adjustable curve ruler.

1 parallel ruler.

ACCESSIONS TO THE LIBRARY.

Books and other publications have been received and placed in the library of the Board during the fiscal year ending June 30, 1897, as follows:—

BY GIFT, EXCHANGE, ETC. (Names and addresses of donors are printed in italics).

- Abbott, Dr. Samuel W., Sec., Boston, Mass.:*
Water supply and sewerage, Report of Massachusetts State Board of Health to Legislature—Senate Document No. 4.
Manual of Boards of Health of Massachusetts, 1896.
State Board of Health of Massachusetts, Report for 1895.
On the Prevention of Tuberculosis.
- Arnold, Dr. C. D., Sec., El Reno, Oklahoma Territory:*
Biennial Report Oklahoma Territory Board of Health, 1895-96.
Auchincloss, W. T., C. E. Bryn Mawr, Pa.:
Waters within the Earth, and Laws of Rainflow.
- Avery, Dr. H. N., Commissioner, Minneapolis, Minn.:*
State Law; and Ordinance relative to the Inspection of Milk, etc., and Milk Regulations in Minneapolis, Minn.
Supreme court decision in case of State of Minnesota vs. Hans C. Nelson, relative to Milk Inspection and Regulation.—Relation of State to local laws.
- Baker, Dr. Henry B., Sec., Lansing, Mich.:*
Measles in Michigan in 1894 [Reprint No. 476.]
The Etiology and Pathology of Typhoid Fever. [Reprint No. 456.]
Small-pox in Michigan in 1894. [Reprint No. 475.]
Relative to Michigan State Board of Health Exhibit at Tennessee Centennial Exposition at Nashville, 1897 [Circular No. 236.]
Principal Meteorological Conditions in Michigan in 1895.
Communicable Diseases in Michigan in 1894. [Reprint No. 472.]
The results obtained by the use of Diphtheria Antitoxin. [Reprint No. 471.]
The Causation of Diphtheria. [Reprint No. 469.]
Scarlet Fever in Michigan in 1894. [Reprint No. 474.]
Diphtheria in Michigan in 1894. [Reprint No. 473.]
Annual Report of Michigan State Board of Health, 1895.
Consumption in Michigan in 1894.
Typhoid Fever in Michigan in 1894.
Address Pres. Mich. State Board of Health at Annual Meeting at Lansing, April 12, 1895. [Reprint No. 461.]
Twenty-second Annual Report, State Board of Health of Michigan, year 1894.
Alleged Nuisance in Michigan in 1893. [Reprint No. 457.]
Public Health Legislation and Proposed Legislation in Michigan in 1895 [Reprint No. 462.]
Alleged Nuisances in Michigan in 1894.
Whooping-cough in Michigan in 1894.
Injuries and Loss of Life and Property, etc., from Kerosene, 1894.
- Baker, Dr. N. D., Martinsburg, W. Va.:*
Biennial Report of State Board of Health of West Virginia, years, 1895-96.
- Barbour, Dr. L. P., Tullahoma, Tenn.:*
The Diagnosis of Early Phthisis.
- Barnes, Willis, Publisher, New York City, N. Y.:*
The Great White Plague—Consumption.
- Beiner, Dr. H. J., Dir., Christiania, Norway:*
Beretning om Folkemængden og Sundhedstilstanden i Christiania i Aaret 1895.
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- Ward, Prof., Robt., DeC., Cambridge, Mass.:*
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- Waring, Geo. E. Jr., C. E., New York City, N. Y.:*
The Proper Disposal of Sewage.
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- Watson, Dr. Irving A., Sec., Concord, N. H.:*
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- Weyant Fred N., Ph. B., Stetson, Mich.:*
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- Williams, G. S., Chief, Detroit, Mich.:*
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- Wingate, Dr. U. O. B., Sec., Milwaukee, Wis.:*
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- Woodruff, Clin'on R., Sec., Philadelphia, Pa.:*
Publications of the National Municipal League—Pamphlet No. 4, Constitution and by-laws of Leading Reform Organizations.
- Woods, Dr. J. T., Health Officer, Toledo, Ohio:*
Annual Report of Board of Health, City of Toledo, year 1895.
- Woodward, Dr. Wm. C., Health Officer, Washington, D. C.:*
Report of Health Officer of District of Columbia, year 1896.
- Wright, Hon. Carrol D., U. S. Commr. of Labor, Washington, D. C.:*
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<i>Wright, Dr. Frank W., Health Officer, New Haven, Conn. :</i>	A Precis of Quarantine Practice at National Quarantine Stations.
Report of the Health Department of the City of New Haven, Conn., year 1896.	Reports of Committee on International Quarantine adopted by Pan-American Medical Congress, at Mexico City, Nov. 16 to 19, 1896.
Report of the Health Department, City of New Haven, Conn., 1895.	Annual report of Supervising-Surgeon General of United States Marine-Hospital Service, year 1896.
<i>Wyman, Dr. Walter, Supervising Surgeon General, U. S., M. H. S., Washington, D. C.</i>	<i>Young, Dr. A. G., Registrar, Augusta, Maine :</i>
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Reports: Inspections of National, State and Local Quarantine Stations.	

ACCESSIONS BY PURCHASE.

The Imperial Health Manual.
 The Ritual of Health.
 Water Supply, by Wm. P. Mason.
 A System of Medicine by Many Writers, Vol. I, by Dr. Thos. C. Allbatt. Cambridge, Eng.
 Rheumatism; its Nature, its Pathology and its Successful treatment, by Dr. T. J. Machagan.
 Physiology of Carbohydrates.
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 The Manual of American Water-Works, 1897.

LOANS FROM THE LIBRARY.

Publications drawn out, and not yet returned, are as follows:

PROF. R. C. KEDZIE, AGRICULTURAL COLLEGE, MICHIGAN.

Annual Report National Board of Health, 1879 (Library No. 2825.)

HENRY F. LISTER, M. D., DETROIT, MICHIGAN.

Separate System of Drainage (Library No. 326).
 Public Health, June 9, 1876 (Periodical).
 Uppingham By-laws and Regulations on House Drainage (Library No. 966).
 Oct., Nov., and Dec. Nos. of "Plumber and Sanitary Engineer" (Periodicals).
 Statement of Objects of Sanitary Protective Assoc., Edinburgh (Pamphlet).
 Player's Elementary Anatomy and Physiology and Hygiene (Library No. 1762)
 Sewerage at Providence, R. I., by Waring.
 Storm Water in Town Sewerage, by Waring.
 Sewerage of Cities, by Waring.
 Separate System of Sewerage, by Waring.
 Climatic Treatment of Consumption (Library No. 6238).
 Medical Communications of Mass. Med. Society.
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 Sequin on Lunacy.
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 Children of the State (Library No. 5545).
 Conference of Corrections and Charities, Omaha, 1887.

C. L. WILBUR, M. D., LANSING, MICHIGAN.

Hirche's Handbook of Historical Pathology (Library No. 5822.)
 Weather and Diseases, by MacDowell (Library No. 9734).
 Trans. College of Physicians and Surgeons, Vol. 17 (Library No. 9739).
 Fecundity, Fertility, and Sterility, by Duncan (Library No. 194).

The Genuine Works of Hippocrates, by Adams (Library No. 8053).
 Handbook of British Fungi, by Cooke, Vol. 1 (Library No. 93).

H. W. DAVIS, LAPEER, MICHIGAN.

Purification of Sewage and Water (Library No. 7778).
 24th Ann. Report Mass. State Board of Health (Library No. 8782).
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J. F. JENKINS, TECUMSEH, MICHIGAN.

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HON. FRANK WELLS, LANSING, MICHIGAN.

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C. C. YEMANS, M. D., DETROIT, MICHIGAN.

Report of Plan of Securing Records of Deaths, by Harris.
 State Board of Health, Indiana, etc., by Stevens (Pamphlet).
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HENRY B. BAKER, LANSING, MICHIGAN.

Journal D'Hygiene, No. for Sept., 1881.
 Vol. 35, Trans. London Med. and Chir. Soc. (Library No. 2642).
 N. Y. Medical Abstract, No. for April, 1883.
 College and Clinical Record, No. for May 1, 1884.
 The Typhoid Fever of America (Library No. 3905).
 Journal Franklin Institute, No. for Nov., 1884.
 Buffalo Medical and Surgical Journal, No. for Aug., 1885.
 Communications Mass. Med. Soc., Vol. 10, 1862.
 Manufacturer and Builder, No. for March, 1879.
 Ventilation and Warming of Buildings, Morrison (Library No. 7147).
 Education and Culture of Women as Relates to Health (Library No. 7470).
 U. S. Quarantine Laws and Regulations, Feb. 24, 1893 (Library No. 8538).
 Immigration Laws and Regulations, March 11, 1893 (Library No. 8558).
 Ann. Report St. Lawrence Quarantine.
 Confectioner's Journal, No. for Jan., 1884.
 National Popular Review, No. for March, 1894.

PROF. S. W. BAKER, BIG RAPIDS, MICHIGAN.

Sanitary Papers of the General Meeting.
 Trans. Amer. Social Science Assoc., 1874 (Library No. 875).
 Report of Com. Concerning San. Condition of Schools in Phila. (Library No. 1767).
 Trans. Sanitary Institute of Great Britain, 1879 (Library No. 4668).

PROF. DELOS FALL, ALBION, MICHIGAN.

Report of Amer. Pub. Health Assoc. (Library No. 993).
 4th Ann. Report State Board of Health, S. C., 1893.
 N. Y. Medical Journal, Vol. 65, Jan. 9, 1897 (Current No.).
 Methods of Practical Hygiene, Vol. 1 (Library 8949).
 Methods of Practical Hygiene, Vol. 2 (Library 8950).
 Manual of Hygiene (Library No. 9312).
 Immunity and Serum Treatment (Library No. 9759).
 Ptomaines and Leucomaines (Library No. 9890).
 Text-Book on Bacteriology (Library No. 10,311).

JOHN HEVENER, LAPEER, MICHIGAN.

Hospitals, Their Organization and Construction (Library No. 3806).
 Cottage Hospitals (Library No. 2470).

civ STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1897.

HOWARD B. BAKER, LANSING, MICHIGAN.

Gould's Medical Dictionary (Library No. 7744).

GEORGE H. CATTERMOLLE, M. D., LANSING, MICHIGAN.

The Hygienic Prevention of Consumption (Library No. 8920).

WILLIAM C. HUME, M. D., CORUNNA, MICHIGAN.

Three Communications, by Paul Gibier, M. D. (Library No. 7716).

CHARLES H. BRUCKER, M. D., LANSING, MICHIGAN.

Fothergill's Handbook of Treatment (Library No. 1026).

A. W. NICHOLSON, M. D., NEWBERRY, MICHIGAN.

General Biology, by MacGinley (Library No. 92).

Principal of Mental Physiology, by Carpenter (Library No. 103).

Study of Biology, by Nicholson (Library No. 154).

Insanity, its Causes and Prevention, by Sterns (Library No. 3955).

Functions of the Brain, by Ferrier (Library No. 715).

Detention, Care and Treatment of Insane (Library No. 9351).

The following table shows the amount and kind of hard paper there was on hand at the time of making the last report, the amount purchased during the year, the amount used, and the amount now on hand.

Kind of Paper.	On hand at last Report.		Purchased since last report.		Used during the fiscal year.		On hand June 30, 1897.	
	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.
Flat.....	1	385				415		450
Crown.....	8	322			5	37	3	285
Folio Post.....	20	378	28		26	135	22	243
Demy.....	8	461			1	351	7	110
Medium.....	3	110				32	3	78
Byron Weston.....		134				10		124
Imperial.....	1						1	
Letter Heads, Office, Linen.....		2,550		4,000		3,550		3,000
Letter Heads, Members, Linen.....		300		1,000		1,275		25
School Cap.....	2					48	1	432
Legal Cap.....	1	12				12	1	
Blotting Paper.....		340				155		185
Blue Cover Paper.....	11				4		7	
Postoffice Paper.....	1	200					1	200
Book Paper, S. S. C. White.....	2	459				9	2	450
Manilla Paper.....	2	120	5	456	2	120	5	456

There are now on hand 4,600 sheets of hard paper of half letter size, and 500 sheets of half note size. There are about 149,428 envelopes on hand at the time of making the last report; 47,000 of the various kinds used in the office have been purchased since, making a total of 196,428.

There are now on hand 69,196 printed envelopes, and 77,920 blank envelopes, making a total of 147,116; about 49,312 have been used in the work of the office.

Postage and postage money on hand at the beginning of the fiscal year (July 1, 1896) \$18.48. Vouchers for postage (for use in the office) have been allowed during the year to the amount of \$1,100.00. Postage

and postage money on hand at end of fiscal year (June 30, 1897) \$68.04. The cost of postage during the fiscal year ending June 30, 1897, has been \$1,050.44, as follows:

Distribution of Annual Reports.....	\$323 36
General distribution of small pamphlets and circulars	113 24
Sending weekly and monthly bulletins of "Health in Michigan"	38 64
Collection and dissemination of information in regard to communicable diseases.....	218 38
Sending announcements and programs for sanitary conventions.....	15 10
Sending meteorological material to observers	10 59
Work in connection with collection of sickness statistics.....	131 47
Securing annual reports from health officers.....	6 46
Securing the names and postoffice addresses of health officers.....	54 27
Distribution of school literature to teachers and others.....	22 94
Regular and special correspondence of the office, postal cards, due postage, drawer rent at postoffice, and all other postage (including a considerable amount for distribution of documents on the restriction of diphtheria, scarlet fever, small-pox, etc., to localities where those diseases occurred)	112 99
	<u>\$1,050 44</u>

TOTAL AMOUNT AND CLASSIFICATIONS OF EXPENDITURES BY THE STATE BOARD
OF HEALTH. AS PER VOUCHERS 2666, 2688-2792, INCLUSIVE, EXCEPT NOS.
2785 AND 2787, ALLOWED DURING THE FISCAL YEAR ENDING
JUNE 30, 1897.

Chemical Analyses.....	-----
Expenses of Members:—	
Attending Meetings	\$86 83
Other Official	69 94
Instruments and books.....	133 73
Paper, Stationery, etc.....	164 51
Postage:—	
Office.....	1,100 00
Members.....	-----
Printing and Binding	341 79
Secretary	3,000 00
Expressage	229 29
Telegrams.....	5 75
Telephone and messages	21 95
Miscellaneous	92 97
Special investigations.....	-----
	<u>\$5,246 76</u>

EXPENDITURES BY THE STATE BOARD OF HEALTH IN THE CALENDAR YEAR, 1896.

The foregoing is reported, in compliance with law, relative to the fiscal year. But the appropriations of the Board are for the calendar year, and they amount to six thousand dollars. The expenses for any calendar year, therefore, cannot exceed six thousand dollars. The following is a classified statement of expenditures for the calendar year 1896:—

CLASSIFIED STATEMENT OF EXPENDITURES BY THE BOARD DURING THE CALENDAR
YEAR, 1896.

Chemical Analyses.....	-----	
Expenses of Members:—		
Attending Meetings.....	-----	\$69 01
Other Official.....	-----	9 27
Instruments and Books.....	-----	173 57
Paper, Stationery, etc.....	-----	414 66
Postage:—		
Office.....	-----	1,026 00
Members.....	-----	2 00
Printing and binding.....	-----	956 19
Secretary.....	-----	3,000 00
Special Investigations.....	-----	3 20
Expressage.....	-----	283 97
Telegrams.....	-----	8 52
Telephone.....	-----	20 00
Miscellaneous.....	-----	53 26
		<hr/> \$5,999 65

NOTE.—A statement of the expenses for school purposes during the calendar year 1897, under Act 142, laws of 1897, will be found in the annual report of the State Board of Health for 1898.

EXPENDITURES ON ACCOUNT OF THE BOARD.

The appropriations (\$6,000) at the disposal of the State Board of Health are for certain specified purposes, not including clerk hire, the publication of the annual report, or the expenses in the examination of plans for public buildings; these expenditures *on account of* but not by the Board are provided for by other acts of the legislature than those appropriating money to be expended by the Board, and the accounts are kept in other offices; not in the office of the State Board of Health; the accounts for clerk hire are kept by the Auditor General, and are reported in his annual report; the accounts for publication of the annual report of this Board, and for expenses in the examination of plans for public buildings, are kept by the Board of State Auditors, and are published in the annual report of that Board.

Respectfully submitted,

HENRY B. BAKER,

Secretary.

ARTIFICIAL RESPIRATION, AND THE TREATMENT OF THE
PARTIALLY DROWNED, SUFFOCATED, OR ELEC-
TRICALLY SHOCKED.*

BY HENRY B. BAKER, 'M. D., LANSING, MICHIGAN.

Ladies and Gentlemen:—Those who have made arrangements for this occasion have thought that this warm season of the year when so many of our boys and young people go into the streams and lakes to swim, is an opportune time for all of us to become familiar with the best ways for bringing back to life any person who has just been deprived of the breath of life.

Every person ought to hold firmly in mind the fact that there are many circumstances and conditions under which a person may lose the breath of life when whether that loss shall be permanent or only temporary depends upon whether or not some person shall be present who knows how—and will promptly act upon the knowledge—to restore the breath of life to that person.

We all know that life is maintained by breathing. Another name for breathing is respiration. To a person partially drowned, or in any way suffocated, fainted, shocked by electricity, or temporarily deprived of capacity for breathing, as for instance by a blow over the stomach, or by a fall upon the back, life may sometimes be brought back by what is called "*Artificial respiration*." Every person ought to know how to perform *artificial respiration*; because in the lifetime of nearly every one of us there will come a time when the life of some other person, perhaps the life of the one dearest of all on earth, may depend upon our having and using that knowledge. It has been my privilege to so use that knowledge that, on at least one occasion, a life has been saved, when without such action death appeared certain. Each one of you may have such an opportunity.

RESPIRATION.

Before studying the details of artificial breathing, it will be useful for us to understand what breathing is for, what it does for us, and what are its essentials.

In order that life shall continue, the temperature of our bodies must be kept at about 98.5° Fah. This temperature is kept up by a sort of internal combustion, that is by a continuous oxidation, to supply which there must be a constant supply of oxygen. Ordinary air contains about four parts of nitrogen to one part of oxygen, and, to supply sufficient oxygen to keep up these internal invisible fires, and thus maintain the life processes, a person ordinarily breathes in about twenty cubic inches of air eighteen times every minute. If this breathing is stopped for any considerable time, not only does the temperature of the body fall, but all those movements which go to make up what is called "life" are stopped. With approximate accuracy, one may say that a person may exist without food for a month, without water for a day, but without air for only about one minute.

* An address to a meeting in Lansing.

As soon as breathing stops, the complete circulation of the blood stops; the blood then continues to pass out of the arteries into the veins, but it does not return to the arteries. After the arteries are empty, artificial respiration fails to supply oxygen to the tissues because the arteries are not carrying blood which by artificial respiration could have been charged with oxygen. In order to be effective for the restoration of life, therefore, artificial respiration must be made soon after the drowning or other suffocation has occurred. I believe that instances have occurred, however, in which artificial respiration has restored life after the lapse of an hour or more of apparent stopping of the breathing; and that in some instances the efforts were successful only after artificial respiration had been steadily continued for an hour or more.

Artificial Respiration.

As I have said, in ordinary respiration about twenty-cubic-inches of air are forced into and out of the lungs about eighteen times a minute. In artificial respiration without any apparatus, probably not so much air can be forced into and out of the lungs; but the effort should be to imitate nature as closely as possible.

A number of methods have been devised for artificial respiration, such, for instance, as Sylvester's method, which consists in regularly raising the arms of the victim full length above his head, and lowering them to his sides, pressing both sides of his chest at the time of bringing the arms down.

A recent number of a periodical says:—

"Among the oddest of recent patented devices are two 'breathing machines', one by a man in Buffalo, the other by a Brooklyn physician.

"A machine for breathing may at first thought appear to be superfluous, and even ridiculous, yet both of these contrivances are of benign intent. They are designed to preserve life, or to resuscitate suspended animation, as in cases of drowning, choking, or a sudden failure of the heart's action.

"Physicians, as is well known, often attempt to produce artificial respiration in such cases by extending the unfortunate person on the ground or on the floor, and alternately raising and lowering the arms. It is to render such artificial respiration more effectual that the two inventions above-mentioned have been sought out.

"The Brooklyn doctor's device consists of an air-tight chamber, or box, in which the sufferer from suspended respiration can be placed, all save his nostrils and mouth, which are open to the external air. By means of an air-pump, connected with the chamber and worked rapidly by a rotary shaft and crank, the air is by turns exhausted and admitted, thus causing, by pneumatic pressure, the lungs to be alternately dilated with air and compressed at the ordinary intervals of natural breathing.

"The Buffalo inventor seeks to accomplish the same end by means of a bellows and tube accurately applied over the nostrils and mouth of the person. Alternate inspiration and exhaustion of air in the lungs are thus brought about. The air-tube before entering the nostrils passes through a small heating apparatus. This raises the air to the temperature which it would reach naturally in the air-passages of a healthy person."*

* Youth's Companion, July 8, 1897, p. 324.

The effort to raise the temperature of the air forced into the lungs is wrong. Although it is desirable to supply warmth to the body, it is not a good way to add warmth by the inhaled air, because, under best conditions, it is difficult, by means of artificial respiration, to get sufficient oxygen into the lungs, and much more oxygen can be forced in if the air is not warmed; warming the air expands it greatly, and thus lessens the quantity of oxygen in a given bulk of air. Ordinarily the body is kept warm by the action of the oxygen inhaled; therefore the best way is not to warm the air which the patient is to inhale.

Another common fallacy is the idea that the breath of life can be blown into an unconscious person by means of the breath of another person. This also is wrong. Air that has once been breathed is deprived of its life-giving oxygen, and in its place is carbon dioxide, the same noxious gas that is called "choke-damp" in mines and in unused wells. In such an atmosphere life goes out as rapidly as does the candle flame. Therefore never force your own breath into the lungs of an unconscious person.

Many years ago Prof. R. C. Kedzie and myself were a committee of the State Board of Health to prepare rules for the treatment of the drowned, and with the aid of Dr. Beech of Coldwater, we devised rules which were then extensively published by the State Board of Health, and which I believe to be good. The rules have the merit of being capable of being carried out by one person alone; although if others are present they can aid, and especially in restoring warmth to the body of the victim, and in aiding the circulation by rubbing the extremities of the body, forcing the blood in the veins upward toward the body. This direction of the rubbing is of great importance, for the reason which I have mentioned,—in the absence of the natural movements, the blood does not return to the arteries from the veins, and it is very important to grasp and rub the limbs in such a way as to force the blood in the veins upward and backward from the extremities toward the body, so that the circulation of the blood shall be restored and the artificial respiration shall result in sending oxygen to the several parts of the body.

For the restoration of life, there are generally required three actions, —(1) The supplying of air, containing oxygen, by artificial respiration; (2) the supplying of heat, to restore the natural temperature of the body; (3) the supplying of artificial movement of the blood in the veins back toward the heart and lungs, so that the oxygen of the air pumped into the lungs may be absorbed by blood and be carried to the brain and other tissues somewhat as it is in health.

If I have made it plain to you what the artificial respiration is for, it is now time to study how it may best be done, and what are the difficulties to be overcome. One of the most important difficulties results from the fact that the tongue of an unconscious person lying on the back, sometimes falls into the throat so as to prevent the air from entering the lungs; therefore if you permit the person to lie on the back, as in Sylvester's method, you must have some person grasp and hold the tongue out of the mouth. In order to hold the tongue a piece of cloth is necessary, otherwise the tongue will slip out of the fingers. In order to avoid having to hold the tongue, the method which I prefer, and which was adopted by our State Board of Health, is to turn the patient upon his face, so that the tongue will not interfere with the artificial respiration.

If the person to be restored to consciousness has been taken out of the water, the first thing to do is to favor the exit of any water which may be dislodged from the throat and windpipe. This is best done by locking your hands under the middle of the body, raising it as high as you can conveniently, and giving the body a few quick jerks.

Probably I cannot do better than to read to you the results of the work of the committee of the State Board of Health. (Reads the leaflet.)*

I was one of the committee which prepared that leaflet, and, although the work was done over twenty years ago, there is little which can be added at this time. The most important addition would be, I think, a statement of the importance of artificial aid to the circulation of the blood, and a statement of just how to aid the circulation. The leaflet says "The two things to be done:—Restore breathing; restore animal heat." I would change this so that it would read "The three things to be done: Restore breathing; restore animal heat; restore circulation of the blood".

Few people realize what an important aid to the circulation of the blood is supplied by the various muscular movements throughout the body, which occur almost constantly in the body of a healthy person during waking hours. Every time the hand grasps any object much of the blood is forced out of the veins of the hand; at every step taken blood is squeezed out of the veins in the feet and legs. Wherever contraction of muscles occurs in other parts of the body the blood in the veins is forced *towards* the heart, because the valves in the veins prevent the blood from being forced in the direction *from* the heart.

In a person who has fainted, is suffocated, partially drowned, or who has suffered an electric shock, all those muscular movements which in active health tend to keep up the circulation of the blood, cease, and unless they are artificially supplied, a powerful influence for restoration to life is wanting.

Some of the directions in the leaflet cannot be appreciated fully unless one has a good knowledge of the principal facts concerning the circulation of the blood. For instance, the direction is to place the patient "with his head down hill". Probably nearly every person here present would be tempted to do just the reverse of that. I think that many persons who have fainted or lost consciousness because blood containing oxygen no longer coursed through their brains, have died because their friends were so ignorant of physiology that they persisted in raising the head of the unconscious person. The fact is that when the heart stops pumping blood forcibly, so that it will no longer *rise* to the head, the person faints; and, unless the head is placed as low as or lower than the rest of the body, the blood flows out of the head, there can then be no proper nervous supply to the heart and lungs, and what under some circumstances might have been only a temporary faint becomes permanent in death. It is exceedingly important to remember that every unconscious person should be placed with the body in a nearly horizontal position with the head slightly lowered. It may serve to help you remember this if I tell you that experiments have been made with small animals, mice, for instance, giving a number of them chloroform until they were unconscious, then permitting some of them to remain lying flat while others were held up by their tails and twirled around. Those thus twirled were

* It is printed in an amended form immediately following this paper.

resuscitated and lived, while those allowed to remain without any aid to the circulation did not regain consciousness, but passed on to death. This shows us that, to resuscitate a person unconscious and threatened with death by chloroform, not only should artificial respiration be carried on, but the head should be kept low and the circulation of the blood aided by rubbing the blood *from* the extremities toward the heart. Probably the same directions are applicable to all forms of unconsciousness from which there is hope of resuscitation. In apoplexy from hemorrhage into the brain, such efforts at resuscitation will do no good and might possibly do harm; but ordinarily there are facts connected with apparent drowning, suffocation, fainting, electric shock, chloroform, gas inhalation, etc., which will enable a person to judge whether or not a person is unconscious from one of these causes or from apoplexy.

In all cases where the blood is saturated with chloroform, chloral, illuminating gas, or carbonic acid from beer tanks, or in an unused well, time must be given for the vapors to pass from the blood to the air pumped into the lungs by the artificial respiration; therefore, the efforts for artificial respiration should be continued for a long time.

None of us knows just what form of unconsciousness may supply one of us the first opportunity for the trying of artificial respiration for the resuscitation of some person; but in the warm season of the year drownings are not uncommon, and at all seasons of the year, recently, the electric wires are ready, in case of accident, to cause unconsciousness. In electric shock, I believe that, at the present time, there is no treatment more important to try, whenever there is the slightest hope, than artificial respiration and the aids to the circulation which I have tried to make plain to you.

[237.]

TREATMENT OF THE DROWNED, SUFFOCATED, OR ELECTRICALLY SHOCKED.

THREE THINGS TO BE DONE:

**Restore Breathing; Restore Animal Heat;
Restore the Circulation of the Blood.**

RULE 1.—Remove all obstructions to breathing. INSTANTLY loosen or cut apart all neck and waist bands; turn the patient on his face, with the head down hill; stand astride the hips with your face towards his head, and, locking your fingers together under his belly, raise the body as high as you can without lifting the forehead off the ground (Fig. 1), and give the body a smart jerk to remove mucus from the throat and water from the wind-pipe; hold the body suspended long enough to slowly count ONE, TWO, THREE, FOUR, FIVE, repeating the jerk more gently two or three times. Then act by Rule 2.



Fig. 1.

Fig. 2.



RULE 2.—Keep the patient face downward, and maintaining all the while your position astride the body, grasp the points of the shoulders by the clothing, or, if the body is naked, thrust your fingers into the armpits, clasping your thumbs over the points of the shoulders, and raise the chest as high as you can (Fig. 2) without lifting the head quite off the ground, and hold it long enough to slowly count ONE, TWO, THREE. Replace him on the ground, with his forehead on his flexed arm, the neck straightened out, and the mouth and nose free. Place your elbows against your knees and your hands upon the sides of his chest (Fig. 3) over the lower ribs and press downward and inward with increasing force long enough to slowly count ONE, TWO. Then suddenly let go, grasp the shoulders as before and raise the chest (Fig. 2); then press upon the ribs, &c. (Fig. 3). These alternate movements should be repeated 10 to 15 times a minute for an hour at least, unless breathing is restored sooner. Use the same regularity as in natural breathing.

DO NOT GIVE UP TOO SOON: You are working for life. Any time within two hours you may be on the very threshold of success without there being any sign of it.

ceased, a smart slap on the face, or a vigorous twist of the hair will sometimes start it again, and may be tried incidentally, as may, also, pressing the flnger upon the root of the tongue.

Before natural breathing is fully restored, do not let the patient lie on his back unless some person holds the tongue forward. The tongue by falling back may close the wind-pipe, and cause fatal choking.

If several persons are present, one may hold the head steady, keeping the neck nearly straight; others may remove wet clothing, replacing at once clothing which is dry and warm; they may also chafe the limbs, rubbing toward the body, and thus promote the circulation.

Prevent friends from crowding around the patient and excluding fresh air; also from trying to give stimulants before the patient can swallow. The first causes suffocation; the second, fatal choking.

In suffocation by smoke or any poisonous gas, as also by hanging—proceed the same as for drowning, omitting effort to expel water, etc., from wind-pipe.

In suspended breathing from effects of chloroform, hydrate of chloral, electric shock, etc., proceed by Rule 2, taking especial pains to keep the head very low, and preventing closure of the wind-pipe by the tongue falling back.

The foregoing Method and Rules, devised and prepared by the Committee on Accidents, etc., being a modification of Rules furnished by Dr. Beech of Coldwater, and of those published by the Life Saving Society of New York, have been adopted and printed by the STATE BOARD OF HEALTH of Michigan, for distribution throughout the State, as a life-saving measure. Any communication upon the subject may be addressed to OFFICE OF STATE BOARD OF HEALTH, LANSING, MICHIGAN.

PLEASE PRESERVE THIS.
Study it thoughtfully, in order to act efficiently, if occasion requires.

Fig. 3.



RULE 3.—After breathing has commenced, RESTORE THE ANIMAL HEAT. Wrap him in warm blankets, apply bottles of hot water, hot bricks, or anything to restore heat. *Warm the head nearly as fast as the body, lest convulsions come on.* Rubbing the body with warm cloths or the hand, and slapping the fleshy parts may assist to restore warmth, the circulation of the blood, and the breathing also. The rubbing of the limbs should always be from the extremities toward the body. If the patient can surely swallow, give hot coffee, tea, milk, or a little hot slng. Give spirits sparingly, lest they produce depression. Place the patient in a warm bed, and give him plenty of fresh air; keep him quiet.

AVOID DELAY. A MOMENT may turn the scale for life or death. Dry ground, shelter, warmth, stimulants, etc., at this moment are nothing,—ARTIFICIAL BREATHING IS EVERYTHING,—IS THE ONE REMEDY,—all others are secondary.

Do not stop to remove wet clothing. Precious time is wasted, and the patient may be fatally chilled by exposure of the naked body, even in summer. Give all your attention and effort to restore breathing by forcing air into, and out of, the lungs. If the breathing has just

THE TEACHING OF HYGIENE AND SANITARY SCIENCE IN THE SECONDARY SCHOOLS.*

BY PROF. DELOS FALL, M. S., ALBION COLLEGE, MEMBER OF THE MICHIGAN
STATE BOARD OF HEALTH.

At the last meeting but one of the Schoolmasters' Club I presented a "Plea for the Teaching of Sanitary Science in our Public Schools," and in the college section of the State Teachers' Association a similar one, the special plea at that time being for the teaching of this science in our colleges and higher institutions of learning. The first of these papers has since been published in the January number of *Education*, and the second one may be found in the published proceedings of the state association. From the fact that a request has now come for a further consideration of this subject I am pleased to believe that in several important particulars we have reached settled conclusions. We are all coming to a just appreciation of what sanitation will do, that it will be the means of incalculable good to the citizens of our state, that the claims which sanitarians make of the good already being accomplished are true and well founded, that with the present conditions and workings of the health administration very many lives are saved each year, that this good work can largely be augmented by the intelligent coöperation of all the people, and that, therefore, we, as educators, are justified in giving this subject a place in our course of study. The past two years have witnessed a very great willingness on the part of the teachers of Michigan to enter heartily upon this work. The State Board of Health has been taxed to the full extent of its appropriations in order to supply the literature asked for by those who are paying special attention to this subject in their schools. It would thus seem that the two systems of public health and public education are henceforth to be intimately associated, the one aiding the other, and that the knowledge of how to preserve the body in the full possession of all its powers and for the greatest number of years "shall be taught in every school to every pupil," to the end that the legitimate work of the schools, the training of the mental and moral faculties, may proceed with the most certain success.

It has been urged that for the study of hygiene, as it has been carried on in the past, there shall be substituted sanitary science, and that its practical application in the schools should have regard to those causes which produce severe sickness and untimely deaths rather than those sanitary or hygienic sins which merely produce temporary discomfort. And just here is found our first general answer to the question, What shall be taught? namely, teach those facts and principles which have for their end the far-reaching and beneficent result of preventing sickness and premature death. To use a concrete example as an illustration of the principle, do not spend the time allotted to this subject in teach-

*Paper read before a joint meeting of the Michigan Schoolmasters' Club, and the Michigan Academy of Science.

ing the errors of diet, eating too much or too rich food at late hours or between meals, if that is to take the place of teaching the method by which the spread of sickness and death from scarlet fever is prevented. This work is important, and yet it is true that comparatively few die from errors of diet, while many die from scarlet fever, diphtheria, and other communicable diseases. To be sure, there are factors which concern health only a little less potently than those agencies which directly produce disease and death, and some consideration of these should find a place in every course in sanitary science. Such are the subjects of water supply and ventilation.

A second general answer to the first of the three inquiries, what to teach, is one applicable to all new subjects, and yet one not thoroughly appreciated by teachers. Every new subject has its technical terms, its peculiar language, its dialect, if you please, and this is peculiarly true of sanitary science. This language must be learned, its technical terms mastered, defined, translated, and put into practical use. For example, suppose I read the statement in the daily paper that "In February last an outbreak of diphtheria occurred in Blank township which rapidly became epidemic, owing to the failure of certain physicians to correctly diagnose the first cases. Proper precautions are now being carried out, all exposed persons are promptly isolated, the premises placarded, and the rules regarding isolation of the patient and thorough disinfection of all articles which have become infected are rigidly enforced." In the brief statement occur several technical terms which are peculiar to this subject, such as "outbreak," "epidemic," "diagnose," "proper precautions," "placarded," "isolation," "disinfection," "infected." Pupils should be taught to use these words clearly and intelligently. They should also be taught to "read between the lines" and to verify, by some work of their own, such statements as will admit of this treatment.

For example, suppose I read the statement that "In greater London 2082 deaths were registered during the week ending December 5, 1896, corresponding to an annual death rate of 17.6 per thousand of the population." Let the pupil ask and answer the questions: What is the population of greater London? What is the total annual mortality of that city? Notice that the object here is not to ascertain the population of greater London, but rather to scrutinize the statement that its meaning may be clearly apprehended and that a habit of thus testing such statement shall be inculcated. Take another example: The reports of the supervising surgeon-general, United States marine-hospital service (who is he and what are his duties?), for the month of November, 1896, show that in Minneapolis, with an estimated population of 192,833, there were 150 deaths; in Buffalo, with an estimated population of 350,000, the total deaths were 309, and in Cleveland, estimated population of 330,279, total deaths were 346. These statements of themselves convey little, if any, significant or intelligent information. Are these rates high or low? How do they compare with each other? How do they compare with the state of Michigan? With the town in which I live? We have not done our duty by them when we have merely pronounced the words or read the sentences; they must be digested, assimilated, transformed, compared. Let the teacher and pupil, therefore, cultivate the habit of answering the numerous questions which are raised by such

statements. Compare the three cities named as to healthfulness. Find statistics, if possible, of your own town and make comparisons with the above. What would have been the total annual mortality in your own town at the rate shown above for Buffalo? How many people died in the state of New York during the year 1896, if the death rate for the whole state was the same as that shown above for Buffalo? How many in Michigan at the same rate? etc.

It has been my purpose to give at this time a more specific and detailed answer to the question: What shall we teach? but this cannot be done until we have determined the proper answer to the *How much* and the *How*? From some standpoints it is to be regretted that we have no suitable text-book on this subject, and yet this very condition will make sure that much material, which in its way is the best in the world, will be utilized and thus enable it to serve the purpose for which it has been produced. Very little literature, I imagine, receives as much study and revision, pruning and correction, as much time spent in attaining to absolute scientific accuracy, as have the circulars issued from the office of the state board of health. They represent the work and experience of a great many years; they have stood the test of actual use in the practical affairs of sanitary science; they have been constantly revised and brought up to date. All of this material is placed at the disposal and for the use of the teachers of Michigan. From it and other sources can be gathered the subject-matter for a successful school course. The subject will, therefore, need to be taught orally, and this is the method contemplated in the law passed by the legislature of 1895. The following is a brief bibliography of these publications with which every school should be provided:

One of the late reports of the Michigan state board of health.

One of the late volumes of the vital statistics issued by the secretary of state.

The latest United States census reports, especially the volumes on vital statistics.

The compiled health laws of Michigan.

Various reprints issued by the state board of health and referred to farther in this paper by number.

Special circulars on each of the leading diseases, published by the state board.

Bulletins 130 and 140 of the Michigan Agricultural College experiment station.

The amount of the instruction given in different schools will vary according to the interest in the subject and the fullness of knowledge possessed by the teacher. Under the present conditions the time will necessarily be somewhat limited, and therefore this paper and the practical suggestions which follow are based on the thought of one exercise per week for twenty weeks. The course here outlined must be understood as a merely tentative one, subject to amendment and modification as experience shall suggest.

My own thought concerning the method of conducting the work is to make it, as far as possible, the result of research work conducted by the pupils themselves. Having access to the authorities cited above, they can be furnished with certain questions which, when the answers have been obtained, will form the basis of a further discussion by teacher.

and class. A good pedagogical principle, applicable here as elsewhere, will be to tell a pupil nothing which he can find out for himself. But the teacher must know the subject himself.

Lesson 1. The object of this lesson might be to set forth the necessity and the nature of the instruction in sanitary science and at the same time to show the far-reaching results growing out of such instruction. Every subject should have its complete justification for taking the time and attention of our schools, and this new subject must demonstrate its worth and its right to be.

Consult dictionary and encyclopedia for definitions of sanitary science. It should be remembered, however, that definitions from books which are a decade old will need to be modified so as to contain the thought that the practical application of the principles of sanitary science produces a marked decrease of sickness and the saving of hundreds of human lives; that prevention is the watchword and not cure; that the means of prevention are well known and so simple that they can be understood and put into practice by the common people.

Now let the investigation proceed along the line of the following questions: What is the population of the state? Learn incidentally other interesting facts, such as number of native and foreign-born, number living in cities and in the country, number in the upper and lower peninsula, etc. About how many die each year from all causes? What per cent. is this number of the entire population? Stated in another way, this mortality is about how many per thousand of the entire population? peninsula, etc. About how many die each year from all causes? What per cent. of the total mortality is of most interest to the sanitarian because of the fact that it belongs to the preventable class? What, then, is the sanitary problem to be solved by the united coöperation of all the people of the state of Michigan? These and other facts may easily be obtained by consulting the vital statistics of Michigan. They are summarized in *Education*, January 1897, p. 272.

Lesson 2. This lesson may be of the same nature as the first, but directed more specifically to the statistics of the eight leading diseases which cause the greatest number of deaths in Michigan. Notice that those diseases which cause the most sickness do not necessarily cause most deaths. On this latter point consult reprints No. 425 or 209 of the state board of health. The principal basis of this lesson will be reprint No. 226, and especially the first half of the first page. The diagram* here

DEATHS IN MICHIGAN, 10 YEARS, 1884-93.

_____ CONSUMPTION.
 _____ PNEUMONIA.
 _____ DIPHTHERIA.
 _____ TYPHOID FEVER.
 _____ SCARLET FEVER.
 _____ MEASLES.
 _____ WHOOPING-COUGH.
 1 SMALL-POX.

given was made from figures gathered during the ten years 1884-93, and included in the aggregate for the ten years 54,879 deaths. The diagram may also be taken to represent the relative importance of the given diseases for any one year. Now suppose, which is approximately true,

that one thousand people die in Michigan each year from typhoid fever. Notice that the line in the diagram representing the deaths from that disease is just one inch long. How many deaths from scarlet fever? From diphtheria? From consumption? What per cent. is this last number of the total mortality in the state? If one in every eight of deaths, the world over, is from consumption, "the great white plague," how many die each year in the United States? etc., etc. Close the hour with the thought that all this can be prevented when the people as a whole learn how to coöperate with this end in view.

Lesson 3. An elementary lesson in bacteriology.—One lesson should be devoted to giving elementary ideas concerning the relations which germs or bacteria bear to disease and death.† Look up definitions of disease; notice the etymology of the word disease, *dis-ease*. Give the pupils some general idea as to how germs are handled, how they are grown, what is meant by pure cultures, how they are identified, how the relation of a specific micro-organism to a specific disease is established, etc. For this lesson, Professor Marshall's papers, Bulletins Nos. 139 and 140, issued by the Michigan Agricultural College experiment station, are very valuable.

Lesson 4. Health administration and health laws.—How are the sanitary forces organized by which the work of sanitary reform is to be carried on? The state board of health, its membership, how selected, term of office, salaries, executive officer and his duties; the threefold nature of their work, to collect information, to collate and study this information, to spread the knowledge thus obtained among the people; their relation to the state advisory rather than mandatory. Local boards of health, in townships and cities, organization, duties, responsibilities, relation to state board, must appoint a health officer. The health officer and his powers and responsibilities; physicians and their legal relation to communicable diseases. Lastly and most important of all, the people and their duties and responsibilities under the law. Reprints Nos. 297, 120, and 425 will be helpful for this lesson.

Lesson 5. Means of prevention.—This lesson will deal with the two means which are constantly in use, namely: Isolation and disinfection. Place emphasis on the fact that these means are worthless, or at least they count for very little, unless they are most thoroughly carried out. For example, to burn a little sulphur in the sick room is not disinfection; but the directions must be followed and at least three pounds of sulphur burned for each thousand cubic feet of air space. Isolation is not thoroughly practiced if the mother or the nurse, the cat or the dog, or anything is allowed to pass from the sick to the well or from the room in which the sick are to that part of the home occupied by the well. Study the special circulars on diphtheria and scarlet fever for specific directions concerning isolation and disinfection.

Lesson 6. Life saving.—From my standpoint of experience it will pay to spend at least one exercise hour in making the proof that the efforts which are being made do actually result in the warding off of much sick-

*In Michigan the most dangerous communicable diseases, named in the order of their importance as causes of death, are consumption, pneumonia, influenza, diphtheria, typhoid fever, scarlet fever, measles, whooping-cough, and smallpox.

†The relative importance of these diseases is shown by the diagram, page cxvii. Consumption causes many more deaths than does any other disease.

†Teachers' Sanitary Bulletin No. 1, April, 1898, is on this subject. Page 5, of that Bulletin exhibits pictures of the germs of the most important diseases.

ness and the prevention of many untimely deaths. Study the facts which can be gleaned from Plate No. 922: "Isolation and Disinfection Restricted Scarlet Fever," etc. The conclusions shown in this diagram are perfectly reliable, having been drawn from statistics gathered with the greatest care. The word "outbreak" as used on this diagram perhaps needs definition: For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. Heretofore, when a period of sixty days or over has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak has been considered ended. In order to study the subject systematically there must be a limit in time, as also in area.

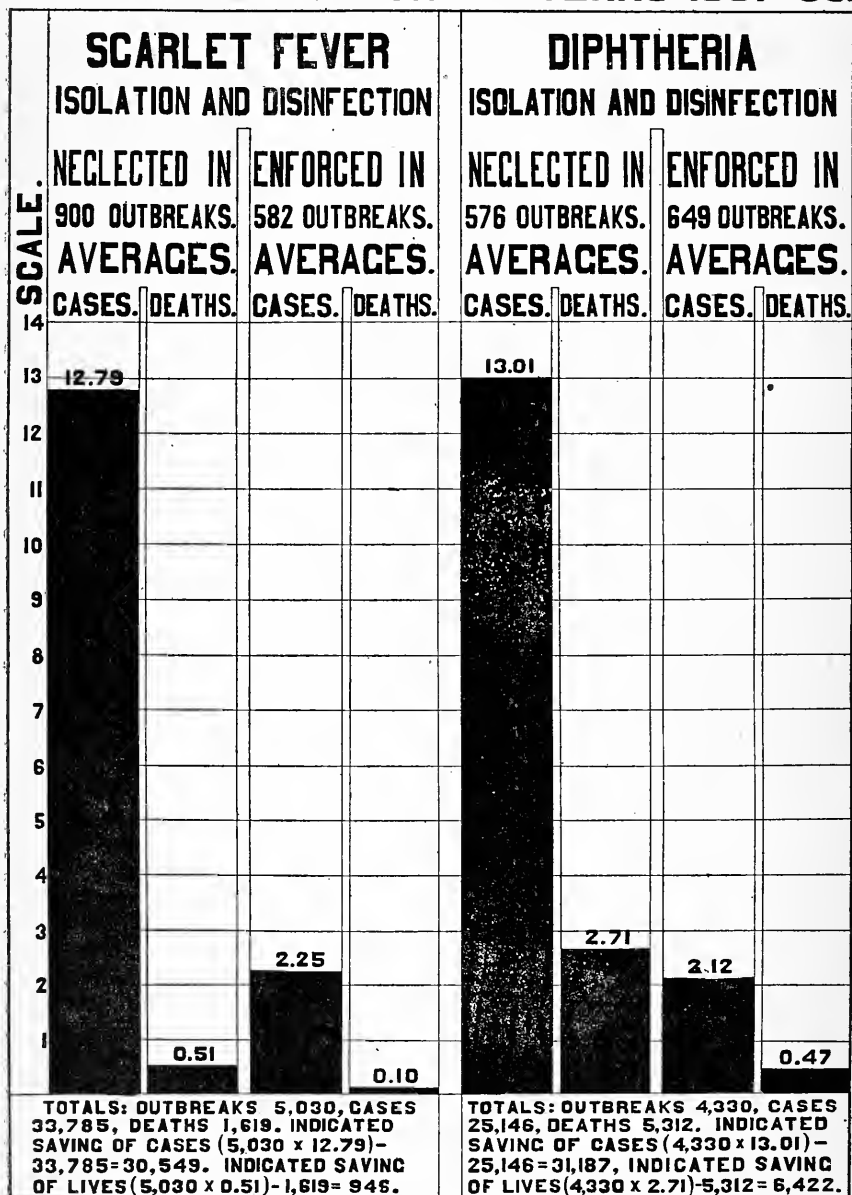
With this diagram before the pupil, let him answer such questions as: How much time is involved in the facts represented? What is the total number of outbreaks? In how many outbreaks was it reported that isolation and disinfection were enforced? How many reports show that these means were neglected? In the former cases, how many persons sick, on the average, per outbreak? How many deaths? Total cases of sickness for the 582 outbreaks? What is shown by a comparison of the average number of cases of sickness when isolation and disinfection were enforced and when neglected? What would have been the total number of cases of sickness if in all the 5,030 outbreaks these means had been (a) neglected and (b) enforced? What is the lesson learned from the comparison of these numbers? Make similar comparisons for the relative number of deaths. Compute the total annual doctor's bill for the state for the sickness from this one disease, supposing that the average period of sickness from scarlet fever is four weeks and the doctor's daily calls at the rate of one dollar a visit. Compute the undertaker's bills and funeral expenses at the rate of \$50 per death.

Close this lesson with the thought that four-fifths, perhaps, of all this can and ought to be prevented, and will be prevented when all have learned to practice the rules of sanitary science. It would do no harm to turn this lesson into one on social science and enforce the truth that one of the great factors, if not the greatest, which produces poverty and distress in this country is disease, with its loss of productive labor and its great debt which must be paid to the physician and the undertaker.

Lessons 7 to 13, inclusive, may be detailed studies of each of the leading communicable diseases. One disease should be studied at a time, the facts being gathered from the special circulars prepared and sent out by the state board of health. These may be enlarged upon by researches in any authorities which may be accessible. When several have been studied, or during the course of these lessons, constant comparisons should be made of these diseases with each other, noting their likenesses and differences.

These lessons should cover the questions of the specific causes of the disease, part of the body affected, premonitory symptoms, period of in-

ISOLATION AND DISINFECTION RESTRICTED SCARLET FEVER AND DIPHTHERIA IN MICHIGAN DURING THE 10 YEARS 1887-'96.



cubation, mode of spread, and methods of prevention. In this way consumption, diphtheria, typhoid fever, measles, whooping-cough, and small-pox should be carefully studied.

In connection with the study of typhoid fever the question of water supply may receive attention, especially the relation which the well sustains to the receptacles for infected excreta and the method by which the typhoid germs make their circuitous, but certain way, from the body of the sick to that of the healthy person.

SUGGESTIONS ON PUBLIC HEALTH WORK IN MICHIGAN.*

BY HON. FRANK WELLS, PRESIDENT STATE BOARD OF HEALTH.

Gentlemen of the Michigan State Board of Health:—

Two years ago, when I last had the honor of addressing you in compliance with the rules of this board, the State and Nation were just recovering from well-grounded fears that cholera, which had become epidemic in many parts of Europe and had menaced us with its horrors, would reach our shores. Though the danger from this old enemy of humanity had passed, another equally dreaded was still ravaging portions of our land. Small-pox was epidemic in Chicago, and had fastened its loathsome fangs upon cities and towns of our State. At that time our thoughts and our efforts had been directed for nearly three years towards preventing these historic giants of destruction from gaining a foothold in Michigan.

Fortunately the entire country was preserved from an inroad from the first of these foes, while science again justified her methods in checking the ravages of the second. The Michigan State board of health felt keenly its responsibility during this period. In few, if in any, of the other States of the Union could those having in charge their health interests have felt greater responsibility. The pathway of a very large proportion of the emigrants from Europe lies across the territory of our State. It was from this class that the danger had been apprehended, for it was this class which it was well known had for many years furnished to our people the seeds of many of the dangerous communicable diseases. Visitors to the exposition at Chicago, and immigrants in unusually large numbers, mostly of the lower classes, passing through our State during these years, excited the fears not only of the members of this board but of nearly all our citizens.

Though these fears may now seem like dreams, and no one in Michigan today expects or dreads an outbreak of either cholera or small-pox, yet it is well to recall the experiences of those days in order to remind us of the fact that our fears were largely due to our knowledge of what these two enemies had meant to mankind in the past, rather than what they mean at the present time. They are conquered foes and wherever intelligence prevails need not be feared. Our losses from them during a quarter of a century do not equal the losses we annually sustain from the weakest of the foes which continually menace us. We believe that all these other

* Presidential Address to the Michigan State Board of Health, at its meeting in Lansing, April 9, 1897.

foes which are always with us may in time be rendered equally powerless. This is a result we hope and strive for, even though the breeding places of these enemies in the old world are continually sending reinforcements to our shores.

Michigan Especially Endangered by Immigration.

A marked effect of the danger from cholera and small-pox, so happily averted, has been, I believe, to impress upon the members of this board and many others this fact—that Michigan is peculiarly liable, from her position, to outbreaks of nearly all the dangerous communicable diseases. These have been in the past and will continue to be brought into her borders by immigrants, from every foreign country. So long as such immigrants are permitted to enter and pass through the State without inspection or disinfection of baggage, it places upon this board and upon many local boards of health, responsibilities and duties unknown to similar boards in most of the other States. Our State and local authorities should not, therefore, be censurable because such outbreaks occur, for under present conditions they are powerless to prevent them. Such authorities are only censurable when they neglect the best known methods for their restriction, and epidemics follow as the result of outbreaks.

I congratulate you on the fact that during the past two years there has been, substantially, restriction of all the dangerous communicable diseases, to the individuals, families or localities in which outbreaks have originated. Outbreaks of these diseases have also, with a single exception, been less numerous during the last two years than during any of the preceding years of which we have records. This important fact, considered in connection with the fact that immigration has greatly lessened during that period, furnishes additional evidence that it is the European immigrant, passing into and through Michigan, who often sows the seeds of disease and death among our inhabitants. For this reason, Michigan needs from those to whom her health interests are intrusted, both State and municipal, unusual courage, judgment and knowledge.

Another reason why Michigan will always require from such officials the exhibition of these qualities, is her natural and geographical situation. Her insular position, her vast coast line, and the numerous streams and bodies of water which form so large a portion of her surface, are conditions which render her inhabitants peculiarly liable to certain diseases.

Michigan is a Summer-Resort State.

The beautiful shores of the larger lakes that so nearly surround our State, their delightful climate during the hot months of the year, together with the picturesque and charming inland lakes that diversify her landscape, are rapidly causing Michigan to become a deservedly-popular health and summer resort for the entire country. Scarcely second in value and beauty to similar resorts upon the Atlantic coast, ours have the advantage of rapidity and ease of access both by water and land, and of the comforts and conveniences of life which many of those upon the shores of the ocean do not possess.

Yearly the number of the best citizens of other States who come to Michigan for health and recreation during the hot months of summer increases. These are welcome guests, for they bring with them intelli-

gence, culture and wealth. As their host, Michigan should not only do all she can to render their visits agreeable, but she should also see to it that they are as free from danger of infectious disease as knowledge and skill can render them.

Summer resorts, experience has shown, are peculiarly liable to those diseases which arise from the use of contaminated water, and from lack of, or defective sewers. Frequently have such resorts been the theatres of epidemics, and those who have sought these delightful retreats for the restoration of health and strength have found instead disease and death. Local health authorities cannot always be depended upon to deal with the problems which arise from the varying conditions pertaining to the unsanitary surroundings which so often exist at these resorts. One of the reasons for this is lack of the necessary knowledge and experience, resulting from yearly entire or partial changes in the personnel of such authorities. Another reason is the sudden transformation of a sparse rural population, during a large portion of the year, to the numbers of a city during the summer months. Local authorities usually reside at a distance from the scene of these changes, and their attention in such cases is rarely called to or their services offered to solve these problems. Members of the State board of health of Michigan acquire this experience, and for this reason are presumably more competent to advise with reference to the questions relating to the health and lives of those who live, for longer or shorter periods, directly upon the shores of our extensive water ways than can those who have no such experience to guide them. Such experience must be of yearly increasing value, and should be utilized in rendering the growing health and summer resorts of Michigan free from those special diseases which always menace aggregations of human beings possessing imperfect or no organized methods for their prevention.

State Inspection in Outbreaks of Dangerous Diseases.

In this connection, it seems to me desirable to call your attention to the method adopted two years ago by this board for investigating outbreaks of dangerous communicable diseases in localities where the local health officials were, from any cause, unable to subdue or discover the cause of such outbreaks and there was liability of the disease spreading. When appealed to under such circumstances, this board has usually sent, as an inspector under act 47, laws of 1893, one of its own employes, Dr. Catermole, a gentleman qualified by education and practice for this purpose, to investigate the character of the disease and all the facts connected with its appearance and progress. These have been reported by him to this board for its action, and the results have thus far been entirely satisfactory. Occasionally the larger experience of Secretary Baker has been invoked for this purpose, when his other duties would permit. The plan has proved successful in accomplishing perfectly the objects sought in such investigations, while the cost to the State has been extremely small.

Actions for Restriction of Diseases Have been Followed by Decreases in Sickness and Deaths.

As you all know, the list of diseases regarded by this board as communicable has been a continually-increasing one. Whenever, as a result

of scientific observation and experience, the members of the State board of health have become convinced that a disease owed its origin to some specific organism capable of being transmitted directly or indirectly from one person to another, always causing the disease when thus transmitted, such disease has been included in the board's list of dangerous communicable diseases. Local health officers were then admonished of the fact, and such rules and regulations as in the board's judgment seemed most practical for the restriction of such disease were furnished. The records in the office of this board show that a marked diminution in the sickness and death-rate has uniformly followed its action in every disease now included in this list, concerning which the advice of this State board has been accepted and adopted.

In none of these diseases has such result been more significant than in the last one so classified by this board—consumption. Work of an educational character was begun by it upon this disease many years ago. Its first leaflet was published in 1891, but it was not until 1893 that it was formally included in the list of "diseases dangerous to the public health."

It was a surprise to me and it may be to you, to learn how rapidly, according to the "sickness-report" cards received at this office, consumption is diminishing in Michigan. So marked was this reduction during the last few years that a comparison of these cards indicates only one-half of the number of cases in 1896 that there were in 1886, ten years before. The reduction thus indicated has been more marked during the latter portion of this period, and is especially noticeable during the last two years. While the Michigan State board of health may not claim all the credit for this remarkable and gratifying result, it is certainly entitled to a very large share of it. To my mind, it is to the educational value of its literature disseminated among the sufferers from this disease and among those exposed to its contagion that this striking diminution is largely due.

New Lines of Sanitary Work.

While the securing of the enforcement by local health officers of the laws relating to isolation and disinfection during outbreaks of contagious diseases, and the distribution of its literature at such times must always, it now seems, be the most important work of this board, yet there are many other lines of work which either in the near or late future it is likely to be called upon to perform. These will come as a result of the sanitary knowledge which is slowly but surely finding its way into the minds of the people. The time is sure to arrive when the general diffusion of this knowledge will render apparent to the many, as is now discerned by the few, various lines of effort whereby this knowledge may be made practical for the protection of human life and health.

Permit me briefly at this time to call your attention to some of these lines; among them, the disposal of garbage, waste and excreta, especially outside the larger cities, and the prevention from contamination or the purification of water supplies, are becoming every year of more and more importance. Investigations of outbreaks of typhoid fever and other diseases of this class by this board have shown that some, at least, of the villages of this State use for drinking water filtrations through all the most offensive results of the habitations of mankind. The ordinary shallow well is the only source of water supply in most of the

smaller towns of the State. In very few of these is any attention paid to the unsanitary surroundings, and in a still less number, if any, is water from wells tested until an outbreak of disease has occurred. Should it not be the duty of the State to exercise supervision where the public health is so vitally concerned, and by means of inspection of the water supply of these hamlets, especially during the later months of the year, not only furnish some degree of protection, but at the same time teach the inhabitants how contamination from this source may be prevented. An obvious objection is the expense, but when we consider the large sums of money placed by the legislatures of Rhode Island and Massachusetts at the disposal of their State boards for practical purposes upon similar lines, in the manufacturing districts of those states, the amount required for the purpose I have indicated in this State should not be withheld. I believe it will not be when the value of such inspection is understood by its citizens.

Milk and Meat Inspection for the Prevention of Tuberculosis.

Another line of work which this board has had in view, but in which it has been unable to do anything practical, is the inspection of those two prime articles of food,—meat and milk. Upon you who know so well that a large proportion of infantile mortality is directly traceable to the use of cows' milk, and that this article as well as the flesh of animals used for food is liable to contain the organism of tuberculosis, I need not urge the importance of State inspection of animals furnishing these foods.

Many of the obscure cases of this common and fatal disease undoubtedly owe their origin to this source. Inspection of cattle seems to be imperatively demanded as an important factor in the work of stamping out this disease. Fortunately in tuberculin we have an unerring test for its existence in animals, so that no loss need be incurred from the slaughtering of suspected animals unless they are shown, by this test, to have the disease. The Live Stock Commission of this State has its veterinarian, Dr. Grange, make tests of herds where it is supposed to exist, and good work has been done by it in extirpating the disease from such herds. Unfortunately animals may have tuberculosis a long time before they show any sign of it to the ordinary observer, and during this period a cow may be furnishing milk charged with the germs of this disease, for human consumption. This can only be prevented by regular and systematic testing of all cows which supply milk for food. Outside of large cities, such inspection can rarely be left to the local health officers, for, although the tuberculin test is shown to be reliable, it cannot be used by inexperienced hands. It is this board which should take the initiative in bringing about government inspection of animals furnishing the milk supply of the State to its citizens, in order that they may be protected from that fatal and insidious disease, consumption, through this source. Inspection of meat, though of less importance because it is usually cooked before being eaten, seems also likely to be demanded when the serious consequences which may follow its being taken into the stomach before being subjected to sufficient heat to kill the organisms, are generally understood. Michigan has properly made wise provisions to secure its citizens against loss or danger from the

use of adulterated food. Danger to health or life from the use of such food, as we well know, is infinitely less than from the milk or flesh of tuberculous animals.

State Hospital for Consumptives.

An effort was made by this board two years ago to secure from the legislature an appropriation to build and equip a State hospital for consumptives. Though the project failed at that session of the legislature, and though the present may not be an opportune time to again ask that body for favorable consideration of this subject, the board has not lost sight of this need of the State, nor does it regard it of less importance now than when it was first proposed.

Among the numerous factories in Michigan where articles are prepared which are intended to go into human mouths or stomachs, many consumptives are known to be employed. The disease is liable to be conveyed by means of the articles they handle, and doubtless to this source might be traced many obscure cases of tuberculosis. Such articles as cigarettes, chewing gum, cigars, capsules, and confectionery, with their wrappers, are all liable to become bearers of infection. It would be unjust to deprive consumptives who are earning livelihoods in such factories of the means of subsistence, but it is still more unjust to permit them to become bearers of the disease to others. To provide a hospital for this class, where its inmates could be made comfortable, where the chance for their improvement would be the best, and where they could learn how they could cease to be a menace to family and friends, and to the public, would not only be an act of humanity on the part of the State, but would materially diminish the spread of this disease.

The removal of all the causes which promote the continued existence of tuberculosis, by the methods we have been considering as well as by others we may yet discover, must continue to be one of this board's most important lines of work until the disease has entirely disappeared from our midst.

Sanitary-Science Teaching in the Schools.

Two years ago an act of the legislature, initiated and advocated by this board, was passed which required that every public school in the State should give instruction in sanitary science to its pupils, and also required the State board of health to supply teachers with its literature for that purpose. No step ever taken by the Michigan State board of health seemed fraught with more far-reaching consequences than this. It placed before a large proportion of the youth of the State knowledge concerning the dangerous communicable diseases, their causes and prevention, far beyond that which was in the possession of the parents of most of them. This knowledge, it was felt, when stamped upon the impressionable minds of children who were soon to become the men and women of the State, would result in producing a generation infinitely better equipped to contend with the foes of life and health than the world had ever before seen.

Teachers, all over the State, became enthusiastic to learn, and to be able to instruct in the new work. In supplying the literature required,

and in paying postage, even with the aid of the office of the Superintendent of Public Instruction, the resources of this board were severely taxed for this purpose, for the legislature had failed to appropriate any money to carry into effect the provisions of the act. An unfortunate result of the expenditure of a large portion of our meagre appropriation for this purpose, as you all know, was the relinquishment of the Sanitary Conventions which for many years had been an important and valuable work of this board. These conventions were for the instruction of adults in sanitary knowledge, in much the same way that children, under the law, are now instructed in the schools. Both kinds of instruction are valuable, and this board will not voluntarily relinquish either.

In this connection, it may not be amiss to call attention to the fact that no proper text book for teaching sanitary knowledge exists. The leaflets of this board, which had been prepared for other purposes, and have been used to supplement the leaflet especially prepared for use by teachers, contained much needless repetition when used for this purpose, while they lack the elements of continuity and of the evidences of the truths upon which all their statements are based. If this board is to continue this work, some one of its members should prepare a text-book suitable for use in public schools. Among our members are those thoroughly competent for this work.

Coöperation of State and Local Boards of Health.

Probably the most important work of the board, in the future as in the past, will be the keeping in active operation the best methods for preventing the spread of communicable diseases. The practical part of this work is wisely left by the law to the local health board and its officers. Upon their knowledge, judgment, fidelity and tact must every community rely when threatened with the spread of any contagious disease. It is for them to see that the means which experience has proved to be the best and which they are instructed by the secretary of this board to use are never neglected. To increase the efficiency of the local health officers of Michigan, and to bring them into closer relations with the State board, three annual conferences of local health officers have been held at Ann Arbor. These have convened in the rooms of the State Laboratory of Hygiene, giving those in attendance opportunity to observe and become familiar with the valuable work and methods of this well-appointed laboratory. The last of these meetings, held in July last, was well attended and was especially valuable and interesting. Dr. Vaughan, the director, and his associate, Dr. Novy, did everything in their power to make this, as well as the former ones, valuable to the conference. Papers and communications by these gentlemen, and by other prominent experts in various departments, kept alive the interest for two days, and rendered great service to the health interests of the State.

I believe every member of this board is impressed with the importance of holding a similar conference every year, for it is manifest that this board cannot in the future afford to leave anything undone which will bring its members in touch with that large body of generally-intelligent men who are now doing so much to preserve the health of the State and who seem desirous of still further increasing their power for good in this direction.

Popular Education in Sanitary Knowledge.

In calling your attention at this time to those lines of work which now seem to me to be of most importance for the future, I am not unmindful of the fact that none of them are new nor that upon several of them work has already been done by you. Neither do I forget that the promotion of the objects we have been considering will require both legislation and money, and I need not tell you that these are not always to be had for the asking merely. I can suggest but one way by which such requirements can be secured. It is a way you are already familiar with and have done much to effect. It is popular education in sanitary knowledge. The flood of light which the last decade has shed upon the causes of all the dangerous communicable diseases and the methods of their prevention, you must continue to disseminate among the people. The prospect for an appropriation by the present legislature which will enable you to continue such educational work in the schools, and also give you means to revive the sanitary conventions which were abandoned two years ago for lack of funds, seems at the present time good. Such aid at this time means much for health work in Michigan. Should it be granted, you will be inspired with increased vigor for the achievement of still greater successes than those which have already crowned your efforts, while the people you serve will be enriched by the outlay many fold.

As the pleasant relations I have sustained towards you as your presiding officer for more than three years terminates today, and as our official relations will doubtless soon cease entirely, it seems a fitting time to express to you how agreeable these relations have been to me. I assure you, one and all, that I have most heartily appreciated my association with you, and shall always remember it as one of the happiest experiences of my life. To those of you who are to continue to bear the burdens and the honors of the noble work upon which we have been engaged, there will, I feel, be no lack of zeal in carrying forward the purposes for which we have striven and which, I believe, have given to this board a reputation and character second to no similar board in our country. I shall continue to watch your work with the deepest interest and with full faith that, as the years go on, your achievements in life-saving work may be even more valuable than they have been during the years that are past.

DISINFECTION OF ROOMS.

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The thorough disinfection of rooms and contents, infected with disease-producing organisms, constitutes one of the chief means for the prevention of the spread of disease. The methods which aim to accomplish this result must stand the test of a thorough laboratory trial. It may be that the requirements exacted in the laboratory are more severe than those met with in actual experience and yet this constitutes the only safe guide as to what a given agent is capable of doing. The laboratory experiment can alone decide how much of the disinfectant is to be used, the length of time it is to act, the influence of the presence or absence of moisture, and how the contents of the room are to be arranged in order to insure disinfection. It is not sufficient to pile the bedding and clothing in one or more heaps on the floor, to burn three or more pounds of sulphur for a few hours and then assume that everything has been done that can be done. The proper disinfection of a room is a most delicate experiment and should be entered upon with a full knowledge of the various conditions which are necessary to success.

There is no chemical disinfectant which will invariably yield the same result regardless of the organism to be acted upon and the surroundings or environment of that organism. Thus, while a mercuric chloride solution may destroy the cholera vibrio in a few seconds it does not follow that it will do the same with anthrax spores. Again the anthrax spores in water suspension will be destroyed by this agent much more rapidly than if suspended in a highly albuminous fluid such as blood. These and similar conditions are equally true for gaseous disinfectants. A gaseous disinfectant, even the very best, may fail simply because it is expected to do too much. We may ridicule the attempt at disinfection of a privy-vault or cesspool by means of a few pounds of copperas but this is no more absurd than many a so-called room disinfection. This or that gaseous agent is said to lack the power of penetration and to be a mere "surface disinfectant". The latter property is an excellent one and constitutes about all that can be expected of a given gas. While it is true that a gaseous disinfectant possesses little penetrating power, that is to say it will not go through several mattresses, or bundles of blankets it should be remembered that this is a deficiency that can be easily remedied if the disinfector will do his share of the work properly.

Sulphur fumigation is used extensively for the purpose of room disinfection. Many doubts have been cast upon its efficiency; largely, perhaps, because it was expected to do too much. The causes of certain diseases such as scarlet fever, measles and small-pox are still unknown, and it is purely gratuitous to assume that because sulphur fumes do not kill anthrax spores and other resistant organisms that they are of no value for disinfection in such diseases as mentioned above. The organ-

isms that produce these diseases are probably as easily destroyed as those of cholera, diphtheria and black-plague. The Michigan State Board of Health, through its efficient secretary Dr. Henry B. Baker, has always warmly advocated sulphur fumigation. When this method is properly carried out there can be no doubt, as may be seen from the experiments to follow, of its efficiency in restricting the spread of certain infectious diseases.

Within the past few years formaldehyde has attracted considerable attention as a disinfectant. Various forms of apparatus have been devised for its generation and employment. In view of the strong claims for formaldehyde and the grave doubts cast on sulphur dioxide, it was thought desirable to make a comparative study of the usefulness of these two agents. This investigation was undertaken largely at the request of the Michigan State Board of Health, and it is hoped that the results obtained will be directly useful to the health officers, physicians and others in this and other States.

The report covers 26 distinct room-disinfection experiments. The number of specimens exposed to the action of disinfectants and then inoculated into culture media exceeds 5,000. It will be evident from these facts that the utmost care, regardless of time, was taken in order to insure practical results.

The room, employed for all of these experiments but one, was especially suitable for the object in view. It was built as a disinfection room at the time the laboratory was constructed and was to have a capacity of 1,000 cubic feet. It really contains 1,016 cubic feet (28.8 cu. m.). In order to make the room perfectly tight the cracks in the edge of the ceiling and in the corners of the room were filled with plaster of Paris. The plaster ceiling and walls were then coated with calcimine and glue and finally given a coat of paint. It should be said that two of the walls were brick and these were not painted. The space between the plaster and wash-boards, door and window frames was caulked with putty. The same was done to the door and window on the outside of the room. The ventilator and waste-pipe opening into the room were plugged tight. During the disinfection the cracks about the door were securely closed by caulking with strips of muslin. The room thus prepared was probably as gas tight as is possible to have one. In the case of the formalin experiments there was no odor in the adjoining rooms in which students were constantly at work. In sulphur fumigation the gas was at times noticeable in the adjoining room. This it may be incidentally mentioned is one disadvantage as compared with formaldehyde. The latter does not tend to pass out of the room, unless of course gross cracks or openings existed, whereas sulphur dioxide will always find an opening be it ever so small. Where the adjoining room is to be inhabited, as in crowded tenement houses, formaldehyde possesses a distinct advantage over sulphur.

Twenty different organisms were exposed to the action of the disinfectant. The first six, as given in the Tables, contain spores. These are anthrax, symptomatic anthrax, tetanus, malignant oedema bacilli; also the hay and potato bacilli. With the exception of the three anaerobic germs and the tubercle bacillus, the other organisms, sixteen in number, were grown on inclined agar at a temperature of 39°C. By means of a sterile, drawn out glass-tube pipette, sterile bouillon (3.4 c. c.) was added

to each agar culture. The growth was thoroughly whipped up and then pipetted off into a sterile Esmarch. The suspensions thus obtained were exceedingly rich in bacteria.

The spores of anthrax were very abundant and were obtained by growing the germs on peptonless agar for several days at 39°C. The cultures of the hay and potato bacilli were likewise several days old and rich in spores. The three anaerobic organisms, those of malignant oedema, symptomatic anthrax, and tetanus were grown in glucose bouillon in hydrogen for 5-6 days. The sediment consisting chiefly of spores, was carefully drawn off by means of a sterile, drawn out pipette with as little dilution as possible.

The names of Sanarelli and Havelburg refer to the bacteria described by these men as the causes of yellow fever. The *Psittacosis bacillus* is the cause of a parrot disease which apparently is communicable to man. The pus producing bacteria are represented by *Staphylococcus pyogenes aureus*, *Streptococcus pyogenes* and the *Green Pus bacillus*.

Sputum containing many tubercle bacilli was employed in preference to pure cultures. The experiments with tubercle bacilli are not numerous but are very conclusive. After exposure, in Esmarch dishes, to the disinfectant the tuberculous material was rubbed up with sterile bouillon and injected intraperitoneally into guinea-pigs.

Sterile silk threads, bits of muslin and cover-glasses were employed in these tests. The silk threads were about $1\frac{1}{2}$ c. m. long. The bits of muslin were about 1 c. m. square. Cleaned cover-glasses 20 m. m. square were cut into halves and sterilized. The letters S. M. and G. in the tables refer to silk, muslin and cover-glasses respectively.

The threads and muslin squares were thoroughly soaked in the bacterial suspensions prepared as mentioned above. Care was taken to spread out each piece of muslin; eventually each piece was turned over so as to insure thorough soaking. The impregnated threads and muslins were then transferred to sterile Esmarch dishes. The cover-glasses were smeared, on one side only, with a large loop full of the bacterial suspension.

One set of specimens thus prepared was placed for 21-3 hrs. at 39°C. to dry. In order to insure drying the tops of the dishes were left slightly ajar. Occasionally a muslin would not dry out completely in this time and hence when exposed to the disinfectant was in reality a moist specimen and as such would be readily disinfected. When dry the specimens were taken out of the incubator and each piece of silk and muslin was carefully loosened from the dish in order that the gas might act on all sides.

The second set of specimens, in order to prevent drying during the time that the first was undergoing desiccation, was placed in moist chambers containing some water. In spite of this precaution some specimens would become dry before the disinfectant had time to act and in such cases the specimen became as resistant as a dry one. As might be expected the cover-glass would be the first to dry, then the silk thread. When about to begin a disinfection both wet and dry sets were placed on a table in the room and the tops of the dishes were slipped to one side. The specimens were therefore in open dishes. Except in the case of the sulphur experiments there were no dishes of water in the room.

At the close of the disinfection period the tops were rapidly replaced and the dishes then taken out of the room. Each specimen was transferred to a tube of bouillon. A sterile forcep was used for each specimen. The fifteen tubes of each anaerobic set were placed together in a Novy bottle and hydrogen was passed through for 1-2 hours. All the bouillon tubes thus inoculated were placed at 35°C. for 5-7 days when they were examined and the results noted. As a result of careful, rapid work contaminations were exceedingly rare. Frequently an entire set of two or three hundred tubes would not show a single contamination.

In the tables “*” indicates that a growth has formed; on the other hand “0” indicates that the tube remains sterile. It should be stated that frequently the growth when present was very slight showing that marked attenuation of the germ had taken place, as a result of the exposure.

TABLE I.—Sulphur Disinfection.

		3 pounds.			6 pounds.					3 pounds.			6 pounds.		
		Dry.	Wet.	Control.	Dry.	Wet.	Control.			Dry.	Wet.	Control.	Dry.	Wet.	Control.
Anthrax.....	{ S. M. G.	**	**	*	**	**	*	Colon bacillus.....	{ S. M. G.	**	00	*	**	00	*
		**	**	*	**	**	†0	*		**	00	*	**	00	*
		**	†0	*	00	†0	*			†0	00	*	00	00	*
Symptomatic an- thrax.....	{ S. M. G.	**	**	*	**	**	*	Sanarelli.....	{ S. M. G.	**	00	*	**	00	*
		**	**	*	**	**	*			**	00	*	**	†0	*
		**	**	*	**	**	*			†0	00	*	00	00	*
Malignant Oedema	{ S. M. G.	**	**	*	**	**	*	Havelburg.....	{ S. M. G.	**	00	*	**	00	*
		**	†0	*	**	**	*			00	00	*	**	00	*
		**	**	*	00	†0	*			00	00	*	00	00	*
Tetanus.....	{ S. M. G.	**	**	*	**	**	*	Psittacosis.....	{ S. M. G.	**	00	*	†0	00	*
		**	**	*	**	**	*			**	00	*	**	00	*
		**	**	*	**	00	*			**	00	*	00	00	*
Hay bacillus.....	{ S. M. G.	**	**	*	**	†0	*	Black Plague.....	{ S. M. G.	00	00	0	00	00	*
		**	**	*	**	†0	*			00	00	*	00	00	*
		†0	00	*	00	00	*			00	00	*	00	00	*
Potato bacillus.....	{ S. M. G.	**	**	*	**	**	*	Staphylococcus pyog. aureus.....	{ S. M. G.	**	00	*	**	00	*
		**	**	*	**	**	*			**	00	*	**	00	*
		**	**	*	**	†0	*			**	00	*	†0	00	*
Cholera.....	{ S. M. G.	00	00	0	00	00	*	Pneumonia (Fraenkel).....	{ S. M. G.	00	00	*	†0	00	*
		00	00	0	00	00	0			00	00	*	00	00	*
		00	00	0	00	00	0			00	00	*	00	00	*
Diphtheria.....	{ S. M. G.	**	00	*	00	00	*	Green Pus.....	{ S. M. G.	**	00	*	**	00	*
		**	00	*	00	00	*			**	00	*	**	00	*
		00	00	*	00	00	*			**	00	*	00	00	*
Glanders.....	{ S. M. G.	00	00	*	00	00	*	Streptococcus pyo- genes.....	{ S. M. G.	**	00	*	**	00	*
		00	00	0	00	00	0			**	00	*	**	00	*
		00	00	0	00	00	0			**	00	*	00	00	*
Typhoid Fever.....	{ S. M. G.	**	00	*	**	00	*	Tuberculosis (see text).							
		**	00	*	**	00	*								
		00	00	*	00	00	*								
Positive growths, including Hay Bacillus (114).....										79	32	51	64	24	55
Positive growths, deducting Hay Bacillus (108).....										74	28	45	60	24	52

*Indicates that a growth formed.
0Indicates that the tube remains sterile.
The specimens were invariably exposed in duplicate.

The specimens were invariably exposed in duplicate. Another set was kept in a cool, dark place for the same length of time as the exposed objects. These controls were then planted into bouillon at the same time as the exposed specimens.

Sulphur Experiments.

In these experiments the sulphur was placed in one or two iron water baths on tripods which were placed in a shallow basin of water. 50 c. c. or more of alcohol was added to each three pound portion of sulphur, and then set on fire. The sulphur would burn for three or four hours, and as previously stated some sulphur fumes would penetrate into the adjoining room in spite of the utmost precaution in closing up openings. The time of exposure was twenty hours. At the end of this time the room was entered and the articles were removed. When only three pounds of sulphur was used the air in the room, at the end of that period, was irritating but tolerable; whereas with six pounds of sulphur it was well nigh insupportable. The glass dishes, especially when six pounds of sulphur were used, were coated with a white film due to finely divided sulphur. The reaction of this deposit was intensely acid due to sulphurous acid.

A maximum and minimum thermometer was placed in the room during each experiment. In the experiment with three pounds of sulphur the temperature varied from 19-28 degrees C.; while in that with 6 pounds it registered 16-29 degrees C.

The exposed objects, as a rule perfectly dry when taken out, were planted directly into bouillon. The amount of sulphur dioxide adherent to the specimens was not sufficient to act as an antiseptic and inhibit the growth of the organisms, if any life was present. The absence of such inhibiting action was ascertained by repeated and prolonged washing of the specimens of one set in slightly warmed, sterile water. No difference was observed between washed and unwashed specimens and hence in most of the experiments the washing was omitted.

The suspensions used for the exposures in Table I were the same as those used in the paraform experiments (Table II). In order to prevent growth and consequent alteration of the suspension they were kept in a jar immersed in melting ice. The results given in tables I and II are therefore strictly comparable since they are obtained with the same suspensions.

An inspection of Table I will show what sulphur fumigation is capable of doing. In the first place it will be seen that the dry specimens, as compared with the wet ones, are much more resistant to destruction. Furthermore it will be seen that all the wet specimens are killed except the tubercle bacilli and those containing spores. Sulphur, even in six pound quantities, cannot be used to destroy spore containing material or tubercle bacilli. A comparison of this table with the following will show that formaldehyde readily destroys wet spores and tubercle bacilli and this fact demonstrates the relative superiority of formalin over sulphur. In actual practice the physician is not called upon, however, to destroy spore material. With the exception of the tubercle bacillus only vegetating, actively growing, weak forms of bacteria have to be destroyed. It will be noticed that the cholera, glanders, diphtheria, black-plague, pneumonia micro-organisms are quite readily destroyed by sulphur.

With reference to the cholera vibrio it should be noted that even the control tubes fail to develop. This organism is extremely weak and more desiccation for twenty-four hours usually suffices to destroy it. The bacillus of Black, or Bubonic plague is almost as weak as the cholera vibrio.

Six pounds of sulphur are somewhat more destructive than three pounds. This is seen in the larger number of dried specimens that fail to develop. Out of 114 dry specimens only 64 gave a growth when six pounds of sulphur were burned whereas with three pounds of sulphur 79 specimens survived. As a rule the cover-glass specimens were the first to die out. As stated before the suspensions were spread on the upper surface only of the cover-glasses, and this true surface distribution, explains the fact mentioned.

If there is a considerable escape of sulphur fumes into the surrounding rooms the results then are by no means as certain as those indicated above. Even the wet specimens of cholera, glanders, diphtheria and Eberth are not destroyed in such cases.

In order then to insure destruction of vegetating bacteria by means of sulphur fumes it is necessary that these shall be in *direct contact with water*. It is not sufficient to have several pans of water in the room or to inject steam in order to saturate the atmosphere with aqueous vapor. In some experiments one liter of water was distilled into the room in which six pounds of sulphur were being burned. The previously dried specimens were not affected any more than if no steam had been introduced.

No experiments were made with sulphur fumigations for a shorter period than 20 hours. It is highly probable that exposures for 3-6 hours as practiced in some cities are not sufficient to destroy even wet specimens. In the recent Biennial Report of the Department of Health of Chicago, published in 1897 (pp. 85 and 250) a procedure is described which is intended to test the efficiency of sulphur fumigation. Inclined agar tubes are inoculated with the potato bacillus or hay bacillus (spores) and then exposed to the sulphur fumes in the room undergoing disinfection. The tubes are then taken to the laboratory and allowed to develop in the incubator, but more usually at the room temperature. If no growth developed the conclusion was drawn that potato or hay bacillus spores had been destroyed and since these possess a marked resistance it was further assumed that the disinfection of the room itself had been thorough.

As a matter of fact the control test as outlined above is fallacious, for the simple reason that enough sulphur dioxide is taken up by the agar to act as an antiseptic but not as a germicide. Agar tubes prepared as above and exposed for 20 hours to the fumes from six pounds of sulphur are not disinfected. The agar becomes milky, or opaque white in color and becomes intensely acid due to the dissolved sulphurous acid. These tubes when placed in the incubator will invariably fail to develop not because the spores are dead but because their growth is inhibited by the presence of an antiseptic. If some of the material on the surface of such agar tube is transplanted to a fresh agar tube growth will invariably result.

This method of testing the efficiency of fumigation is therefore not to be relied upon. Moreover the spores of the potato bacillus are vastly more resistant, as seen from the following tables, than any of the com-

mon disease-producing organisms. This test it may be added is inapplicable even in formalin disinfection. 120 g. of paraform volatilized in a room of 1,000 cubic feet (4 g. per cubic meter) is not sufficient to disinfect agar tubes which have been inoculated with the two organisms mentioned. These tubes when placed in the incubator promptly develop and if after the exposure transplantations are made to fresh agar tubes the growth will be perfectly normal. This result with agar streaks will be obtained even when most of the silk, muslin and cover-glass specimens are destroyed.

Tubercle bacilli are known to possess considerable resistance, and this characteristic is well demonstrated in connection with sulphur fumigation. A specimen of sputum rich in tubercle bacilli was divided into three equal portions. These were placed in sterile Esmarch dishes. One of the dishes was exposed uncovered for twenty hours in a room where six pounds of sulphur were burned. Another dish was exposed for the same length of time in the room in which 120 g. of paraform were volatilized. After the exposure the contents of the dishes were still moist. Bouillon however was added to each dish, and the contents then were thoroughly stirred up and injected intraperitoneally into two guinea-pigs. The third portion of sputum was not exposed to a disinfectant but was injected into a guinea-pig as a control test. The control guinea-pig died in fourteen days. The guinea-pig that received the sputum which had been exposed to sulphur fumes died in 15 days. Both of these animals showed typical experimental tuberculosis. The guinea-pig that received the sputum that was exposed to formalin vapors was killed a month later and on examination was found to be absolutely free from tuberculosis. Sulphur fumigation is, therefore, of no value even on moist sputum, and hence should not be depended upon in the disinfection of tuberculous material.

The sulphur experiments can be summarized as follows:

Sulphur fumes possess little or no action on most bacteria when in the dry state. If, however, the specimens are actually wet they will be destroyed except in the case of resistant forms such as the spore stage and tubercle bacilli. Sulphur is of no value in the disinfection of wet or dry spore-containing material, or of tubercle bacilli. It can be used for the disinfection of rooms which have been infected with ordinary disease organisms.

To insure good results in these cases, from 3 to 6 pounds of sulphur must be burned for each 1,000 cubic feet of space. The walls, floor and articles in the room should be sprayed with water. The room should be made perfectly tight and should be kept closed for at least 20 hours.

PARAFORM DISINFECTION.

Schering's disinfectant and paraform pastils were employed in these experiments. Paraform, or para-formaldehyde is polymerized formaldehyde. On gentle heating it breaks up and regenerates formaldehyde. The gas thus produced will remain in this condition if moisture is present in the atmosphere. In the absence of moisture the gaseous formaldehyde will re-polymerize and hence will cease to be effective as a disinfectant. With Schering's disinfectant it is maintained that sufficient water is formed by the burning alcohol to prevent this re-polymerization.

Owing to the great solubility of formaldehyde large vessels of water should not be kept in the room to be disinfected. When water is thus kept in a room scarcely any odor of formalin will remain in the room at the end of 20 hours, whereas in the absence of such water the odor at the end of the time mentioned will be intolerable. In the tabulated experiments with paraform and with formalin no vessels of water were allowed in the room.

The maximum and minimum thermometer in the room indicated a temperature of 23 to 27 degrees C. in the experiment with 60 g. of paraform and a temperature of 19 to 28 degrees C. in the experiment with 120 g. of paraform.

60 g. of paraform for 1016 cubic feet corresponds to a little over 2 g. per cubic meter of air space. 120 g. of paraform therefore represents a little over 4 g. per cubic meter. 200 to 300 c. c. of alcohol were used in order to volatilize the paraform.

As stated under sulphur fumigation, the same suspensions were used for the tabulated paraform and sulphur experiments. From these suspensions, kept at the temperature of melting ice, the necessary silk thread, muslin square and cover-glass specimens were prepared each day, in the manner already described.

The exposed specimens were transferred, as a rule, directly to bouillon. In some cases they were previously washed with dilute sterile ammonium hydrate in order to neutralize any trace of disinfectant, but the results were in no wise different from those obtained with unwashed specimens.

A study of Table II will show the same difference between wet and dry specimens as has been pointed out under sulphur. There is this striking difference, however, that wet spore material is thoroughly disinfected with formaldehyde, whereas such material is not affected by sulphur. Formaldehyde is therefore a more energetic disinfectant.

Practically all of the wet specimens were destroyed. It will be noticed, however, that 120 g. of paraform do not possess a greater action than 60 g. Indeed the results were not so good. It is possible that several of the wet specimens dried out before sufficient formalin was generated and hence they acquired the resistance of dried specimens. As might be expected the cover-glass preparations would be the first to dry out, the silk thread next and last of all the muslin squares. Of the 9 positive growths 7 were from cover-glasses and 2 from silk threads. In the first set all three of the survivals of the wet set were cover-glass preparations.

It will be noticed further that the weak disease-producing organisms such as cholera, black plague, glanders, diphtheria, are nearly all destroyed even in the dry state.

Tubercle bacilli when in a wet condition are readily destroyed by formaldehyde vapors. Here, as in the case of spore destruction, is seen the superiority of formaldehyde vapor over sulphur fumes. The experiment in disinfection of tuberculous sputum has been described in connection with the sulphur experiments.

The results obtained with Schering's Disinfectant may be briefly summarized as follows:

60 g. of paraform pastils, per 1,000 cubic feet of space, are sufficient to destroy within 20 hours, all organisms regardless of whether they are present as spore or vegetating forms, *provided they are wet*. It is not

sufficient to inject steam into the room. At least steam generated from one liter of water and injected into the room containing dry specimens will not alter the results. The walls and floor of the room, and whatever articles are present (previously spread out as much as possible,) should be thoroughly sprayed with water before exposure to the formalin vapors.

TABLE II. -*Paraform Disinfection.*

		60 g.			120 g.						60 g.			120 g.		
		Dry.	Wet.	Control.	Dry.	Wet.	Control.				Dry.	Wet.	Control.	Dry.	Wet.	Control.
Anthrax	{ S. M. G.	**	00	*	**	*0	*	Colon Bacillus.....	{ S. M. G.	**	00	*	**	00	*	*
		**	00	*	**	00	*			**	00	*	**	00	*	*
		**	*0	*	**	*0	*			00	00	*	**	*0	*	*
Symptomatic an- thrax	{ S. M. G.	**	00	*	**	00	*	Sanarelli.....	{ S. M. G.	**	00	*	**	00	*	*
		**	00	*	**	*0	*			**	00	*	**	00	*	*
		**	00	*	**	00	*			**	*0	*	**	00	*	*
Malignant Oedema	{ S. M. G.	**	00	*	**	00	*	Havelburg	{ S. M. G.	**	00	*	**	00	*	*
		**	00	*	**	*0	*			**	00	*	**	*0	*	*
		*0	00	*	*0	00	*			*0	*0	*	**	**	*	*
Tetanus	{ S. M. G.	**	00	*	**	00	*	Peittacosis.....	{ S. M. G.	**	00	*	**	00	*	*
		**	00	*	**	00	*			**	00	*	**	*0	*	*
		**	00	*	**	00	*			*0	00	*	**	*0	*	*
Hay Bacillus.....	{ S. M. G.	**	00	*	**	00	*	Black Plague	{ S. M. G.	*0	00	*	*0	00	*	*
		**	00	*	**	*0	*			00	00	*	00	00	*	*
		*0	00	*	00	00	*			00	00	*	00	00	*	*
Potato Bacillus.....	{ S. M. G.	**	00	*	**	00	*	Staphylococcus pyog. aureus.....	{ S. M. G.	**	00	*	**	00	*	*
		**	00	*	**	00	*			**	00	*	**	00	*	*
		**	00	*	**	00	*			**	00	*	**	00	*	*
Cholera	{ S. M. G.	00	00	0	00	00	0	Pneumonia (Fraenkel)	{ S. M. G.	**	00	*	**	00	*	*
		00	00	0	00	00	0			**	00	*	**	*0	*	*
		00	00	0	00	00	0			*0	00	*	00	00	*	*
Diphtheria.....	{ S. M. G.	*0	00	*	**	00	*	Green pus	{ S. M. G.	**	00	*	**	00	*	*
		*0	00	*	**	00	*			**	00	*	**	00	*	*
		00	00	*	00	00	*			*0	00	*	00	**	*	*
Glanders	{ S. M. G.	*0	00	*	**	00	*	Streptococcus pyo- genes.....	{ S. M. G.	**	00	*	**	*0	*	*
		00	00	*	00	00	*			**	00	*	**	00	*	*
		00	00	*	00	00	*			**	00	*	**	00	*	*
Typhoid Fever.....	{ S. M. G.	**	00	*	**	00	*	Tuberculosis (as text under sulphur).....								
		**	00	*	**	00	*									
		*0	00	*	*0	00	*									
Positive growths, including Hay Bacillus (114).....										82	3	54	84	9	54	
Positive growths, deducting Hay Bacillus (108).....										77	3	51	80	9	51	

*Indicates that a growth formed.

0Indicates that the tube remained sterile.

The specimens were invariably exposed in duplicate.

FORMALIN DISTILLATION.

In Table III are given the results obtained in the first trials with distillation of formalin. Formalin solutions on heating are said to readily polymerize giving rise to paraform, which is supposed to interfere with further evaporation. Obviously the cheapest and best way of employing

formaldehyde as a gaseous disinfectant will be the distillation of formalin solutions. It is a matter of unnecessary expense to convert formalin into paraform and then from this regenerate formaldehyde vapors. The autoclave employed by Roux and Trillat in their experiments with formalin gave excellent results. Unfortunately the size, weight and expense of such an apparatus precludes its general use, and limits it to the Health Boards of large cities, and to large hospitals.

The fear of polymerization of formalin on boiling, is not well grounded. Certain it is that formalin can be distilled from its aqueous solution without polymerization, and that the results obtained are in every way equal to those obtained with paraform, and decidedly superior to the so-called formalin lamps. We have made no tests with formalin lamps being convinced that they were but ephemeral play things which would not fulfil the requirements of practical disinfection.

TABLE III.—*Formalin Disinfection.*

	60 g. rapid distillation.			120 g. slow distillation.				60 g. rapid distillation.			120 g. slow distillation.		
	Dry.	Wet.	Control.	Dry.	Wet.	Control.		Dry.	Wet.	Control.	Dry.	Wet.	Control.
Anthrax { S. M. G.	**	00	*	**	00	*	Colon Bacillus..... { S. M. G.	**	00	*	**	*0	*
Symptomatic an- thrax { S. M. G.	**	00	*	**	00	*	Sanarelli { S. M. G.	**	00	*	**	**	*
Malignant Oedema { S. M. G.	**	00	*	**	00	*	Havelburg..... { S. M. G.	**	00	*	**	*0	*
Tetanus { S. M. G.	**	00	*	**	00	*	Psittacosis { S. M. G.	**	00	*	**	**	*
Hay Bacillus..... { S. M. G.	**	00	*	**	00	*	Black Plague { S. M. G.	00	00	*	00	00	*
Potato Bacillus .. { S. M. G.	**	00	*	**	00	*	Staphylococcus pyog. aureus { S. M. G.	**	00	*	**	*0	*
Cholera { S. M. G.	00	00	*	00	00	*	Pneumonia (Fraenkel)..... { S. M. G.	**	00	*	**	00	*
Diphtheria..... { S. M. G.	**	00	*	**	00	*	Green pus { S. M. G.	**	00	*	**	*0	*
Glanders { S. M. G.	*0	00	*	**	00	*	Streptococcus pyo- genes { S. M. G.	**	00	*	**	*0	*
Typhoid Fever..... { S. M. G.	**	00	*	**	00	*	Tuberculosis						
Positive growths, including Hay Bacillus (111).....	96	13	54	95	40	55							
Positive growths, deducting Hay Bacillus (108)	91	13	51	89	39	52							

*Indicates that a growth formed.
0Indicates that the tube remained sterile.
The specimens were invariably exposed in duplicate.

The results given in Table III were obtained by distillation of the ordinary 40 per cent. solution of formalin. 150 c. c. of formalin solution, containing therefore 60 g. of formaldehyde, were placed in a 1½ liter flask and 10 per cent. of sodium chloride was added to prevent polymerization. Subsequent experiments showed that sodium chloride was unnecessary. The flask was provided with a rubber stopper and a bent glass tube which was inserted into the room through the key-hole. The contents of the flask were then heated to boiling by means of a Bunsen Burner. In about 50 minutes the liquid was completely evaporated and at no time was there a sign of polymerization. At the end of 20 hours when the room was opened the formalin vapors were intolerable.

Table III combines the results obtained in four separate experiments. The first ten organisms were tried first, in order to test the efficiency of the method. Subsequently suspensions of the other organisms were prepared and tested in a similar manner. These suspensions as stated in the beginning were very rich in bacteria. It should be understood that they were different from those employed in the Tables I and II.

In the first set 150 c. c. of formalin solution, representing 60 g. of pure formaldehyde, were distilled as rapidly as possible. In the second set double this amount was used corresponding to 120 g. of pure formaldehyde. The distillation in this case was carried on at a slow rate requiring about three hours to evaporate almost to dryness. It may be added incidentally that the formalin solutions employed were examined quantitatively and found to contain 39.7 per cent of formaldehyde. The temperature in the room during the first set ranged from 17-24 degrees C., whereas in the second set it ranged from 20-29 degrees C.

As a result of the slow distillation many of the cover-glass preparations and silk threads dried out before enough formalin was present in the room and hence acquired the resistance of dried specimens. This experiment is intended to show the importance of having the object to be disinfected in a wet condition and of rapid distillation of formalin. Although twice as much formalin was distilled as in the first set yet the results are decidedly inferior owing to the reason just given.

When the formalin is rapidly distilled the results are in no wise inferior to those obtained with paraform.

THIN SUSPENSIONS.

The first three tables contain the results obtained with thick suspensions prepared in the manner described. The silk thread, muslin square or cover-glasses are coated with a mass of organisms such as will hardly be met with in practice in an ordinarily well kept room. Those experiments therefore may be considered as very severe tests of the efficiency of the several methods examined. Ordinarily infectious material that may be scattered about in a room is in a fine state of division as dry dust. Even when infectious material as saliva or sputum, in diphtheria, tuberculosis, etc., is spread over the surface of an article it dries down in a very thin layer and it is safe to say contains but relatively few organisms in a given area, as compared with the test specimens from thick suspensions mentioned above.

In order to obviate this objection a series of experiments were carried out, as given in Table IV, using very thin, *homogeneous* suspensions. For

this purpose most of the test organisms were grown for several generations, of 12 hours each at 39 degrees C. In this way very thin, perfectly homogeneous bouillon cultures were obtained. In one or two instances where there was a tendency to form scum this was removed by filtration through a sterile absorbent cotton and glass wool filter. The anthrax and potato spore material was obtained from agar cultures. Only a portion of the surface growth was rubbed up with bouillon and diluted to about 8 c. c. with sterile bouillon and then filtered as above. Bouillon cultures of the anaerobic cultures were employed diluted with an equal volume of bouillon, and filtered to remove gross particles.

TABLE IV. (Part a.)—*Thin Suspensions.*

	Sulphur.		Formalin.		Formalin (Large room).			Formalin.	
	A.		B.		C.			D.	
	3 pounds 20 hours.		60 g. 20 hours.		60 g. per 1,000 cu. ft. 20 hours.			60 g. 10 hrs. expo-ure.	
	Dry.	Control.	Dry.	Control.	Dry.	Wet.	Control.	Dry.	W t.
Anthrax	S. ** M. ** G. 00	* * * * *	** ** * * *	* * * * *	** 00 ** 00 00	00 00 00 00 00	* * * * *	00 00 *0 00 00	00 00 00 00 00
Symptomatic anthrax	S. ** M. ** G. **	* * * * *	** ** * * *	* * * * *	** 00 ** 00 00	00 00 00 00 00	* * * * *	** 00 00 ** 00	00 00 00 00 00
Malignant Oedema	S. ** M. ** G. **	* * * * *	** ** * * *	* * * * *	** 00 ** 00 00	00 00 00 00 00	* * * * *	** 00 *0 00 00	00 00 00 00 00
Tetanus	S. ** M. ** G. **	* * * * *	** ** * * *	* * * * *	** 00 *0 00 00	00 00 00 00 00	* * * * *	** 00 *0 00 00	00 00 00 00 00
Hay Bacillus (omit'ed)	S. --- M. --- G. ---	---	---	---	---	---	---	---	---
Potato Bacillus	S. ** M. ** G. **	* * * * *	** ** * * *	* * * * *	** 00 ** 00 00	00 00 00 00 00	* * * * *	** ** ** ** **	00 00 00 00 00
Cholera	S. 00 M. 00 G. 00	0 0 0 0 0	00 00 00 00 00	0 0 0 0 0	00 00 00 00 00	00 00 00 00 00	0 0 0 0 0	00 00 00 00 00	00 00 00 00 00
Diphtheria	S. ** M. ** G. 00	* * * * *	** ** * * *	* * * * *	00 00 00 00 00	00 00 00 00 00	* * * * *	00 00 00 00 00	00 00 00 00 00
Glanders	S. ** M. *0 G. 00	* * * * *	00 00 00 00 00	* * 0 0 0	*0 00 00 00 00	00 00 00 00 00	* * * * *	00 00 00 00 00	00 00 00 00 00
Typhoid Fever	S. ** M. ** G. 00	* * * * *	*0 00 00 00 00	* * * * *	** 00 00 00 00	00 00 00 00 00	* * * * *	00 00 00 00 00	00 00 00 00 00

* Indicates that a growth formed.

0 Indicates that the tube remained sterile.

The specimens were invariably exposed in duplicate.

For each trial fresh specimens were prepared from these thin suspensions in exactly the same manner as in the preceding experiments. The same suspensions were used for all four experiments given in Table IV.

In order to prevent alteration in the suspensions in the $2\frac{1}{2}$ days necessary for the four experiments the suspensions were kept in a jar in melting ice. No change was observable in the material thus kept.

In experiments A, B and C the exposure lasted 20 hours as in all previous experiments. Experiment D was of only 10 hours' duration. In experiments B, C and D the vapors of formaldehyde were distilled into the room, through the key-hole, by boiling formalin solution in the apparatus to be presently described: The same room has been used for all the experiments described in this paper except in Experiment C, Table IV.

TABLE IV. (Part b.)—*Thin Suspensions.*

		Sulphur A.		Formalin. B.		Formalin (Large room). C.			Formalin. D.	
		3 pounds 20 hours.		60 g. 20 hours.		60 g. per 1,000 cu. ft. 20 hours.			60 g. 10 hrs. exposure.	
		Dry.	Control.	Dry.	Control.	Dry.	Wet.	Control.	Dry.	Wet.
Colon Bacillus.....	{ S.	**	*	**	*	**	-----	*	**	0)
	{ M.	**	*	**	*	**	-----	*	**	00
	{ G.	00	*	**	*	**	-----	*	00	00
Sanarelli.....	{ S.	**	*	**	*	**	-----	*	**	00
	{ M.	**	*	**	*	**	-----	*	*0	00
	{ G.	00	*	**	*	**	-----	*	00	00
Havelburg.....	{ S.	**	*	**	*	**	-----	*	**	00
	{ M.	**	*	**	*	**	-----	*	**	00
	{ G.	*0	*	**	*	00	-----	*	**	00
Psittacosis.....	{ S.	**	*	**	*	**	-----	*	**	00
	{ M.	**	*	**	*	**	-----	*	**	00
	{ G.	00	*	*0	*	**	-----	*	*0	00
Black Plague.....	{ S.	00	*	00	*	00	-----	*	00	00
	{ M.	00	*	*0	*	00	-----	*	00	00
	{ G.	00	0	00	*	00	-----	*	00	00
Staphylococcus pyog aureus.....	{ S.	**	*	**	*	**	00	*	**	00
	{ M.	**	*	**	*	**	00	*	**	00
	{ G.	*0	*	**	*	**	00	*	**	00
Pneumonia (Fraenkel).....	{ S.	**	*	**	*	**	-----	*	00	00
	{ M.	**	*	**	*	*0	-----	*	00	00
	{ G.	00	*	00	*	00	-----	*	00	00
Green Pus.....	{ S.	**	*	**	*	**	-----	*	*0	00
	{ M.	**	*	**	*	**	-----	*	**	00
	{ G.	00	*	00	*	00	-----	*	00	00
Streptococcus pyogenes.....	{ S.	**	*	**	*	**	00	*	**	*0
	{ M.	**	*	**	*	**	00	*	**	00
	{ G.	**	*	**	*	**	00	*	**	*0
Tuberculosis (See text Exp. B.).....		-----	-----	-----	-----	-----	-----	-----	-----	-----
Positive growths out of 108 specimens....		75	50	81	50	67	-----	51	50	4

*Indicates that a growth formed.

0Indicates that the tube remained sterile.

The specimens were invariably exposed in duplicate.

Experiment A.—A comparison of the results obtained with thin suspensions will show little or no difference with the results given in Table I. Only dry specimens were exposed since previous trials have clearly shown that three pounds of sulphur will destroy all vegetating forms in the wet condition. Omitting the hay bacillus results in Table I, inasmuch as this organism is not represented in Table IV, it will be seen that out of a total of 108 dry specimens 74 survive exposure in Table I and 75 in Exp. A., Table IV. The temperature of the room varied from 20-24 degrees C. The odor at the end of 20 hours was tolerable.

Experiment B.—In this experiment 150 c. c. of formalin solution were distilled into the room in about 30 minutes. The temperature of the room varied from 20-22 degrees C. The odor at the end of 20 hours was tolerable. For the reason mentioned under Exp. A. only dry specimens were exposed. The results were fairly satisfactory 81 out of 108 dried specimens survived the exposure. These results, however, are by no means as good as those in Experiments C and D wherein the same method was followed. This is probably due to slower and possibly less complete distillation.

Material from the tuberculous lung cavity, very rich in tubercle bacilli was divided into three portions and placed in wide Esmarch dishes. One of these was placed at 39 degrees C. for about 3 hours till dry. A second was exposed in the wet condition and the third reserved for direct use as a control. After exposure bouillon was added to each of the dishes, the material thoroughly rubbed up and injected intraperitoneally into guinea-pigs. The control guinea-pig died in twenty-four hours as a result of diplococcus infection. The guinea-pig that received the dried material likewise died of diplococcus infection in less than three days, whereas the guinea-pig that received the material which was exposed in a wet condition survived without the slightest illness but when killed three weeks later showed small tubercular nodules in which tubercle bacilli were demonstrated. These results show that in a dried layer of sputum the micrococci of sputum septicaemia (Frankel's diplococcus) will survive exposure to formaldehyde and undoubtedly this is true likewise of the tubercle bacillus since it possesses in general a greater resistance than these organisms. In moist material the diplococci are killed more readily than tubercle bacilli. The latter undoubtedly escaped destruction owing to the large amount of material used (3 c. c.) and the presence of more or less of solid particles.

Experiment C.—This experiment is given as a crucial test of the value of the formalin distillation method. The large laboratory room was employed for this purpose. The dimensions of this room are $36\frac{1}{2} \times 36\frac{1}{2} \times 12\frac{1}{2}$ feet. It contains therefore 17,334 cubic feet (490.84 cu. m.). The room has seven large windows and two doors; also six or eight ventilating shafts which unite into a main shaft in the attic. Large cracks extended around the entire edge of the ceiling. The ventilating and cold-air shafts were plugged with bundles of old cloth. The cracks in the ceiling, about the edge of the floor, windows and doors were caulked with strips of cloth.

On the basis of 60 g. of pure formaldehyde per 1,000 cubic feet 2,600 cu. c. of the 40 per cent formalin solution was necessary for the disinfection of this room. This amount could not be added all at once to the apparatus which was employed and will presently be described. One liter of the solution was added, and in about three-fourths of an hour a

second liter was added, and after a like interval the remaining quantity was introduced. A little over 3 hours was necessary to distil this amount of formalin. Attention may be called to the great advantage of this apparatus over the so-called formalin lamps, or even the paraform apparatus. The same apparatus will do for large or small rooms. If all the formalin necessary for disinfection cannot be added at once, it can be added in portions during the process itself.

The specimens were placed at the farther end of the room. A complete set of dry specimens and in addition wet specimens of spore material were exposed. At the end of 20 hours when the room was entered the formalin vapors were intolerable, and at no time were they noticeable in the adjoining rooms.

As shown in Table IV C, all the wet spore specimens were disinfected. Of the 108 dry specimens 67 survived exposure. The fine dust taken from the floor at the farther end of the room was sterile. The dust on the top of the cases in the room had apparently lain there for a year or more. A considerable amount of this could easily be gathered by means of sterile spatula. Portions of dust, the size of a small pea, placed into bouillon showed no sign of growth for the first couple of days, eventually however a "potato bacillus" developed. Practically therefore all surface dust in the room, and a large portion of the specimens exposed were disinfected.

Experiment D.—150 c. c. of formalin solution were distilled, by means of the apparatus to be described, as rapidly as possible (*in 10 minutes*) into the disinfecting room of 1,000 cubic feet capacity. The formalin vapors were allowed to act for ten hours. The room was then opened. The vapors were present in such amount as to be insupportable. The temperature ranged from 20-22 degrees C. Both dry and wet specimens were exposed. The control tests given under C are also applicable to D since both tests were made at the same time with the same material.

Of the wet specimens only four survived. Three of these were cover-glass preparations and one a silk thread. They undoubtedly dried out before the gas had acted a sufficient length of time.

Of the 108 dry specimens only fifty survived. This it will be seen is the best result obtained in this series of experiments.

By *rapid* formalin distillation it is possible therefore to disinfect all wet material in 10 hours. Possibly one-half this time will accomplish the same result. Dried specimens of the germs of cholera, diphtheria, glanders, typhoid fever, black plague, and pneumonia were all destroyed in the same time.

No work has been done with less than 60 g. of formalin per 1,000 cubic feet.

AVAILABILITY OF FORMALIN.

While sulphur fumigation under certain conditions, as shown in the preceding experiments, is of value it is nevertheless evident that it is more obnoxious, to persons in adjoining rooms, more injurious to fabrics, and certainly less effective than formalin. There can be no question but that formalin will eventually wholly displace sulphur fumigation. Formalin, perhaps as yet, may not be obtained in every drug store but it will soon, undoubtedly, be as easy to obtain as sulphur.

As indicated heretofore, formaldehyde vapors may be obtained in three ways. First, by incomplete combustion of methyl alcohol. This is the

basis of the so-called formaldehyde lamps. The slow combustion, and their uncertain action render them of very little or no practical value. The second method is to polymerize formalin, converting it into the solid form. On heating this material by means of an alcohol lamp the formaldehyde is regenerated. While this method gives excellent results and is much more certain than a formaldehyde lamp, it nevertheless possesses certain drawbacks.

In the first place an additional and unnecessary expense is created in making paraform out of formalin, and in regenerating the gas from this compound. Again, the apparatus for heating the paraform is placed within the room to be disinfected, and remains there until the room is opened. It is not possible to disinfect a number of rooms in the course of a day, unless a corresponding number of "disinfectors" are at hand. For the disinfection of a very large room a number of such apparatuses must be employed. Moreover the apparatus almost invariably, cannot be watched either to prevent chance of fire or to control the method itself.

The third method of using formaldehyde consists in heating the commercial formalin or formol which is a 40 per cent solution of formaldehyde. Formaldehyde vapors are thus generated, and can be injected through the key-hole into the room. The statement is freely made that formaldehyde solutions cannot be heated without polymerizing and thus interfering with further evaporation. Formalin if heated slowly in an open dish may possibly polymerize, especially when concentrated to about 25 c. c., but we have never found this to take place when the formalin solution was heated rapidly in a glass flask or copper container. This fact can be utilized as the basis of a practical method for room disinfection.

Roux and Trillat devised an autoclave in which the formalin could be superheated and the resultant vapors then injected into the room. Various modifications of their apparatus have appeared from time to time. So far as our knowledge goes, none of these can be said to possess the merits of cheapness, simplicity and general usefulness. The results obtained by distillation of formalin from a glass flask (given in Table III) were such as to justify further experimentation. The outcome was the construction of a very simple apparatus shown in the accompanying sketch. A similar apparatus, designed by Prof. A. B. Stevens, has been in use in the Chemical Laboratory to produce steam for distillation purposes. The experiments with formalin described in Table IV were made with this apparatus, and are a sufficient testimonial of its usefulness.

The container is 6 inches in diameter. The height of the cylindrical part is 5 inches; the total height to the top of the neck is 10 inches. The capacity of the cylindrical part of the container is 2,300 c. c. An inclined tube 12 inches long and one-quarter inch in diameter screws into the neck. This is connected by means of a short piece of rubber tubing to a narrower tube which is 12 inches long and three-sixteenths of an inch in diameter. A rubber connection between the tubes is better than a rigid one. The end tube readily passes through an ordinary key-hole. The first tube is inclined to permit reflow of condensed water.

The funnel tube is prolonged into the interior of the container and extends to within one-sixteenth of an inch of the bottom. The height to the top of the funnel is 11 inches and the diameter of the funnel tube is five-sixteenths of an inch. The funnel tube serves the

double purpose for introducing the formalin solution, and as an indicator of the completion of distillation. As soon as the liquid in the container has evaporated down to the level of the bottom of the funnel tube the formalin vapors and steam will issue from the tube. When therefore this tube extends down to within one-sixteenth of an inch of the bottom practically the entire quantity of the liquid can be distilled into the room to be disinfected. Not more than 10 g. of residue is left in the apparatus at the close of distillation.

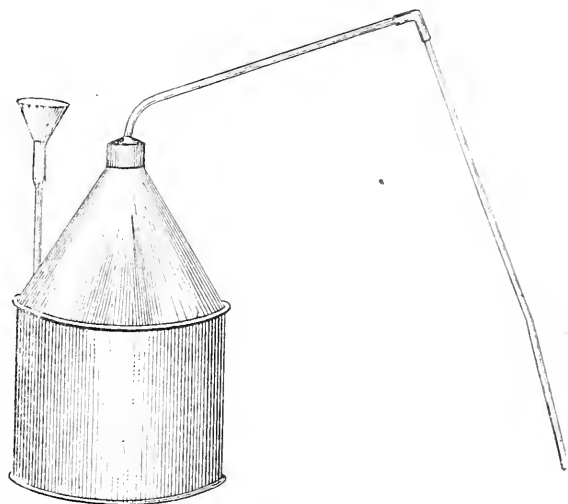


PLATE 930

The vessel is made of copper and the tubing is of brass. The apparatus is placed on a tripod and heated with a Bunsen gas burner. It may be placed on a gas or gasoline stove, or over a kerosene lamp. A portable heater similar to a plumber's lamp will undoubtedly be most useful.

The formalin should be boiled as rapidly as possible. A good Bunsen burner will distil 150 c. c. of formalin, the amount necessary for 1,000 cubic feet of space, in 10-15 minutes. Where the room is very large as in Experiment C, Table IV, the necessary amount of formalin can be added in several successive portions. It is perhaps desirable not to add the formalin too rapidly inasmuch as the rapid cooling of the contents might result in the production of paraform. An increase of heat immediately after such addition will serve to promptly dissolve any paraform that might form.

It is well to repeat, by way of emphasis, that there is no trouble with polymerization when formalin is heated in a flask or in this disinfecting apparatus. Should there be a tendency for the formalin to polymerize it could be prevented by the addition of 5 or 10 g. of borax. Solid paraform may be added to boiling formalin in a flask and it will dissolve, forming an opaque white liquid. If a little borax is present the paraform will dissolve perfectly. It may be interesting to note that if 5 g. of borax and 60 g. of paraform are added to 100 c. c. of 40 per cent formalin and heated perfect solution will result.

Commercial formalin then dissolves a considerable amount of paraform on heating, and the amount may be increased by the addition of borax. This fact may be utilized in shortening the time of distillation. Thus, to disinfect a room of 2,000 cubic feet capacity, 150 c. c. of formalin, 60 g. of paraform and a little borax can be introduced into the apparatus. This mixture could be distilled over in one-half the time necessary for 300 c. c. of formalin.

Paraform when suspended in water and boiled will cause much foaming and it cannot therefore be distilled with water in this apparatus. If however it is added to formalin, with or without borax, it can be distilled very rapidly without the slightest foaming.

At the close of a distillation it not infrequently happens that the formalin vapor present in the container condenses and polymerizes. A solid plug of paraform is thus formed. Consequently before using the apparatus care should be taken to see that the tube is open. If this is not the case, on gentle heating the paraform will be readily volatilized, or a wire probe can be passed through the tube.

As seen from the illustration and description, the apparatus is simplicity itself, and can be made by any tinsmith. It can be obtained from the Eberbach Hardware Co. of Ann Arbor, or from Parke, Davis & Co. of Detroit.

The advantages possessed by this apparatus may be briefly summarized. One apparatus is sufficient regardless of the size of the room or rooms to be disinfected. The same apparatus can be used for almost any number of disinfections in the course of the day. The distillation of formalin into an ordinary room need not take more than 20 or 30 minutes. It is easily portable since it is very light and is not voluminous. Inasmuch as it remains on the outside of the room before the eyes of the operator, there is absolutely no danger of fire or explosion. The apparatus, formalin and fuel are inexpensive.

In conclusion the following general directions for the disinfection of rooms may be of value:—

1. All cracks or openings in the plaster or in the floor or about the door and windows should be caulked tight with cotton or with strips of cloth.

2. The linen, quilts, blankets, carpets, etc., should be stretched out on a line, in order to expose as much surface to the disinfectant as possible. They should not be thrown into a heap. Books should be suspended by their covers so that the pages are all open and freely exposed.

3. The walls and floor of the room and the articles contained in it should be thoroughly sprayed with water. If masses of matter or sputum are dried down on the floor they should be soaked with water and loosened. No vessel of water should however be allowed to remain in the room.

4. 150 c. c. (5 ounces) of the commercial 40 per cent solution of formalin for each 1,000 cubic feet of space, should be placed in the distilling apparatus, and distilled as rapidly as possible. The key-hole and spaces about the door should then be packed with cotton or cloth.

5. The room thus treated should remain closed for at least 10 hours. If there is much leakage of gas into the surrounding rooms a second or a third injection of formalin at intervals of 2 or 3 hours should be made.

HYGIENIC LABORATORY,

University of Michigan.

STATE LABORATORY OF HYGIENE.

REPORT OF WORK DURING PERIOD—JANUARY, 1889, TO JUNE 30, 1898.

This laboratory was established by the Legislature of 1887 and is now a part of the University at Ann Arbor. A new building was erected in 1888 and the laboratory was opened for work in January, 1889. The objects had in view in the establishment of this laboratory were as follows: (1) Original research as to the causation of disease; (2) sanitary examination of food and water; (3) instruction to students. During the ten years that have passed since the organization of the laboratory the work has been conducted strictly along these lines.

The value of original investigation cannot be overestimated. Research work constitutes the real *raison d'être* of a laboratory. Scientific facts bearing upon the causation and prevention of disease are to be discovered and verified, not merely accepted at second-hand. For this reason investigations have been pursued along many different lines. The results of these studies have been published in nearly fifty articles in the various home and foreign scientific journals.

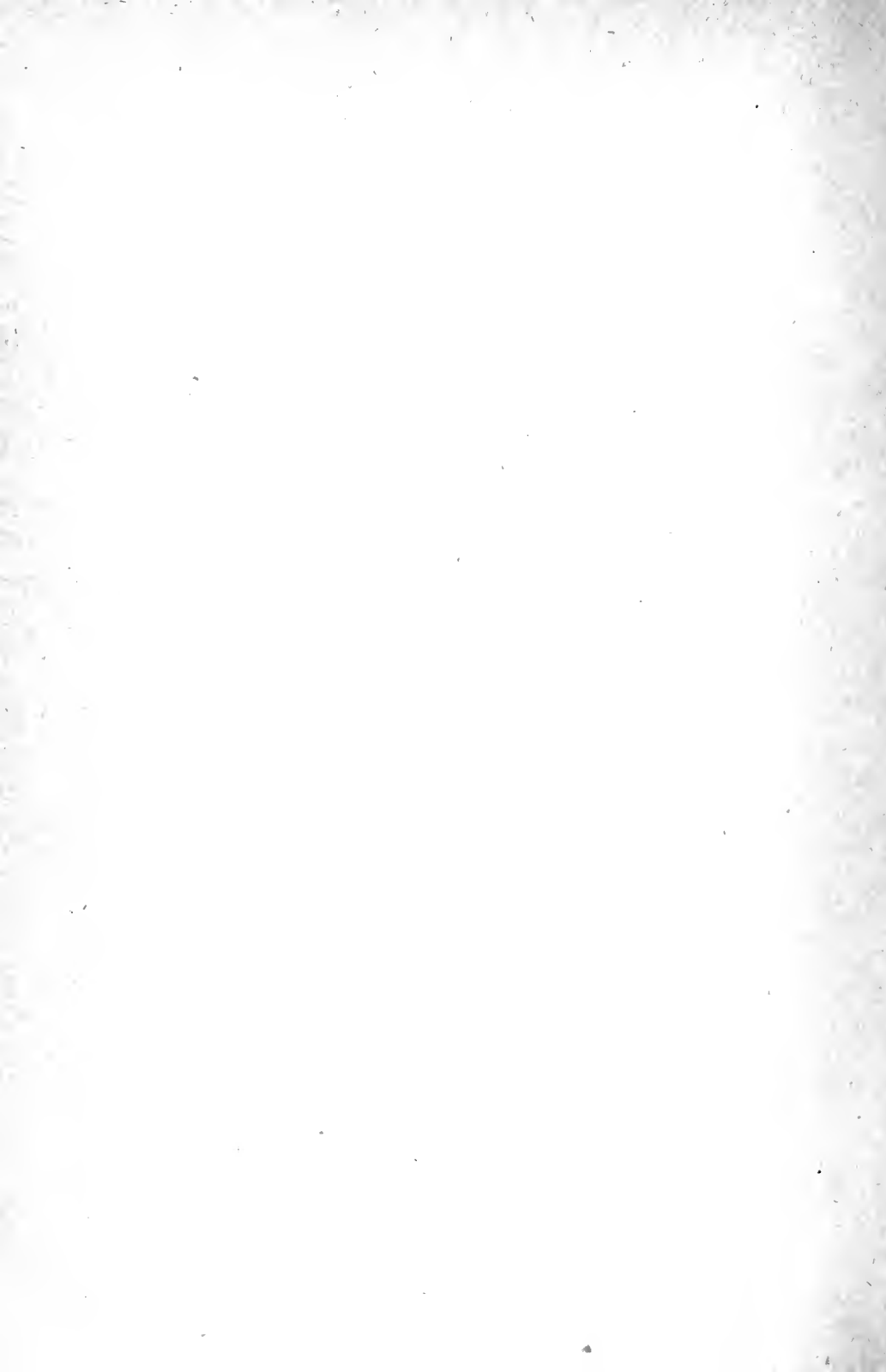
During this period a very large number of examinations for disease-producing bacteria have been made. Examinations of sputum from consumptives are made daily. Several thousand of such examinations have been made. The laboratory is frequently called upon to make the bacteriological diagnosis in cases of suspected diphtheria. Not infrequently glanders, lumpy-jaw and other diseases are examined for similar purposes. A considerable number of specimens of diphtheria antitoxin have been examined as to their strength.

The sanitary examination of food and water constitutes another important line of work carried on in the laboratory. Various foods, such as cheese, milk, meats, sausage, etc., have been examined for adulterations and more often for the presence of poisonous bacteria and their products. Since the organization of the laboratory more than 400 samples of water have been examined as to their purity for drinking purposes, and, not infrequently, such water is suspected of being the carrier of typhoid fever. Every sample of water received is subjected to a chemical analysis and to a bacteriological examination. The latter relates, not merely to the number of bacteria present, but also to the kind of bacteria present and whether or not these organisms are capable of producing poisons. In 85 out of more than 400 samples of water thus examined have pathogenic bacteria been found.

The instruction to students demands a great deal of time. Every year more than 200 students are given instruction in actual laboratory work in bacteriology and in the examinations of foods and water. Advanced students are constantly at work carrying on special studies along the line of original research.

The laboratory is greatly overcrowded as a result of the large number of students carrying on practical work. It has more than outgrown its present quarters and it is to be hoped that at no distant date provision will be made for a new and more commodious laboratory.

The staff of the laboratory consists of four men. Dr. V. C. Vaughan, Professor of Hygiene and Physiological Chemistry, is the Director of the laboratory. Dr. F. G. Novy is Junior Professor of Hygiene and Physiological Chemistry. Dr. Julian McClymonds and Mr. H. H. Waite are assistants.



[PART II.]

PRINCIPAL METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1896.

COMPARISONS OF CONDITIONS IN 1896 WITH THOSE IN PRECEDING
YEARS.

A COMPILATION OF REPORTS BY OBSERVERS FOR THE STATE BOARD OF HEALTH
AND FOR THE UNITED STATES WEATHER BUREAU.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH.

In the Annual Reports of this Board, there has been published for each of the years 1877 to 1895, inclusive, a summary relative to the principal meteorological conditions as observed during the year. This paper continues the subject for the year 1896. The names of the observers for that year, and the months in that year for which copies of registers of meteorological conditions were received from each, are stated in Exhibit 1. In Exhibit 2, is given the latitude, longitude, and elevation of each of these stations. In the tables which follow, reports received from any observer for less than half the year have not been used.

The principal conditions treated in the following tables are temperature, relative and absolute humidity of the air, cloudiness, fogs, rainfall, ground water levels, ozone, velocity and direction of the wind, and pressure of the atmosphere. The tables on each subject are illustrated by diagrams representing to the eye variations in the given condition from month to month through the year, at the several localities represented.

These tables give not only the meteorological conditions for the year and month under consideration, but they also contain, for purposes of comparison, statements of the average conditions for the longest period available in each case.

In the latter part of the Annual Report volume for 1886, there was published an article on "The Causation of Pneumonia," in which extensive use was made of meteorological statistics, especially those relating to the meteorology of Michigan. In the Annual Report for 1887, in an article on "The Causation of the Cold-weather Diseases," influenza, tonsillitis, bronchitis, scarlet fever, diphtheria, and small-pox are proved to sustain very close relations to meteorological conditions. Extensive use of meteorological

and sickness statistics is made in the Report for 1887, in an article entitled "The Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-passages." In the Report for 1891, "Abstract of Proceedings, April 14, 1891," in a discussion on the subject of "The Causation of Influenza," is an important use of the meteorological data, with diagrams and other evidence, showing how closely influenza is associated with atmospheric temperature, humidity, ozone, and wind. In the Report for 1891, page cxxvii, is an article entitled "Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-passages in Colorado," in which are also data relative to other States and countries. In the Report for 1894, pages clix-ccxiv, is a paper on "The Causation of Influenza and Allied Diseases with Suggestions for their Prevention," in which important use is made of the meteorological data collected in Michigan since 1877. In each of the Annual Reports of this Board since that for the year 1877 considerable use has been made of the sickness statistics in Michigan for the complete study of which, data of the meteorological conditions coincident with the sickness is required.

EXHIBIT 1.—Names of observers whose reports are summarized in the following Meteorological Tables and Diagrams, their places of observation, and the counties and geographical divisions of the State in which these places are situated, and months for which reports were received from each observer.

Name of Observer.	Place of Observation.	County.	Division of the State.*	Months (inclusive) for which Registers were Received.
W. C. Gates, M. D.	Rockland	Ontonagon	U. P.	January to December.
Henry R. Patrick, Observer, U. S. Weather Bureau	Marquette	Marquette	U. P.	January to December.
C. L. Bozzell, Observer, U. S. Weather Bureau	Sault Ste. Marie	Chippewa	U. P.	January to December.
S. E. Wait	Traverse City	G'd Traverse	N. W.	January to December.
H. McP. Baldwin, Observer, U. S. Weather Bureau	Alpena	Alpena	N. E.	January to December.
D. W. Mitchell, M. D.	Harrisville	Alcona	N. E.	January to December.
Geo. W. Felger, Observer, U. S. Weather Bureau	Grand Haven	Ottawa	W.	January to December.
Wm. M. Edmondson, Observer, U. S. Weather Bureau	Port Huron	St. Clair	B. & E.	January to December.
John S. Caulkins, M. D.	Thornville	Lapeer	B. & E.	January to December.
E. S. Pettyjohn, M. D.	Alma	Gratiot	C.	May to December.
Prof. R. C. Kedzie	Agr'l College	Ingham	C.	January to December.
Thomas S. Ainge	{ Office St'te B'd of } { Health, Lansing }	Ingham	C.	January to December.
C. E. Beers	Adrian	Lenawee	S. C.	January to December.
Asaph Hall, Jr., Director, Detroit Observatory	Ann Arbor	Washtenaw	S. C.	January to December.
J. H. Kellogg, M. D.	Battle Creek	Calhoun	S. C.	January to December.
Lewis Marvill	Parkville	St. Joseph	S. C.	January to December.
C. C. Tefft	Tecumseh	Lenawee	S. C.	January to December.
S. Alexander	Birmingham	Oakland	S. E.	January to December.
Norman B. Conger, Inspector and L. F. Official, Weather Bureau	Detroit	Wayne	S. E.	January to December.

* The counties in each division are stated in Exhibit I. on a subsequent page, in next article.

The article in this Annual Report relative to "Causes of Diseases," based upon weekly reports of sickness in Michigan, may well be studied in connection with this article, the main purpose of which is to serve as a basis for studies of the causes of diseases.

It is believed that there is nowhere else so complete a statement of the facts relating to meteorology of Michigan as is here presented, for any use for which such knowledge may be needed, now or hereafter.

EXHIBIT 2.—*Latitude and Longitude, Elevation above Sea Level, and the Average Temperature, and Average Barometric Pressure in 1896, at Meteorological Stations in Michigan,—the names of the Stations being arranged in order by latitude, highest first.*

Localities in order of Latitude, those farthest North, first.	Latitude North.	Longitude West from Greenwich.	Altitude (Approximate) above Sea Level.—Feet.	Height of Mercury in Cistern of Barometer above Sea Level.—Feet.	Average Temperature, 1896. Degrees Fabr.	Average Atmospheric Pressure, 1896. Inches of Mercury corrected for Temp.
Rockland.....			1,190.34			
Marquette.....	46°34'	87°24'	669.			
Sault Ste. Marie.....	46°28'	84°22'	642.			
Alpena.....	45°5'	83°3'	587.			
Traverse City.....	44°45'	85°40'	598.	605.	46.38	29.317
Alma.....	43°25'	84°45'	750.	756.		
Harrisville.....	43°40'	83°30'	616.		43.77	29.332
Grand Haven.....	43°5'	86°18'	590.			
Port Huron.....	43°0'	82°26'	602.			
Thornville.....	* 42°55'	* 83°10'	\$ 975.	\$ 950.	48.95	28.986
Agricultural College.....	42°44'	84°29'	820.	834.	47.99	29.047
Lansing, S. B. of H.....	† 42°44'	† 84°33'	‡ 900.	917.	48.31	29.086
Birmingham.....	42°30'	83°10'	‡ 752.		49.01	29.108
Detroit.....	42°20'	83°3'	603.9			
Battle Creek.....	42°20'	85°11'	800.		49.62	
Ann Arbor.....	42°17'	83°44'	930.	936.	48.41	29.044
Albion.....	42°14'	84°45'	965.	985.75		
Tecumseh.....	* 42°1'	* 83°57'	835.	840.	47.87	29.161
Adrian.....	41°53'	84°11'	770.		48.63	29.148

* Estimated from lines on a map of Michigan, issued by the General Land Office, Department of the Interior, 1878. For stations having no reference mark, the latitude and longitude were stated by the observer on the meteorological reports received.

† The exact latitude and longitude of the astronomical post placed in the ground near the new Capitol at Lansing, by the U. S. Lake Survey in 1875, as determined by the observations then made, is 42°43' 53.11" N. and 84°33' 19.63" W.

‡ Estimated from data on "Railroad Profiles," pages 179-187, Annual Report of the State Board of Health for 1873.

\$ Estimated from data in Tackabury's Atlas of the State of Michigan.

¶ Estimated from comparisons of the barometrical observations at Lansing, Port Huron, and Grand Haven for the four years, 1879-82.

NOTE.—Green's standard barometer was used at the above stations for the year 1896.

EXHIBIT 3.—Average Temperature by Year and Months, for each of the Years 1882-96, and the Average for the 19 Years, 1877-95. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 19 Yrs., '77-95	46.25	21.23	23.23	29.83	44.57	55.90	66.47	70.76	68.12	61.56	49.23	36.04	28.05
1882	47.14	24.32	33.42	34.12	42.65	51.04	64.43	67.84	69.05	61.71	53.53	37.90	25.72
1883	43.52	15.78	20.03	24.63	43.00	51.37	64.73	68.36	65.41	57.24	46.73	38.10	26.89
1884	44.72	15.14	20.94	28.78	42.00	54.38	67.04	66.70	66.10	64.72	51.56	34.53	24.77
1885	42.36	15.46	10.21	19.51	41.39	53.32	63.39	71.13	63.23	59.14	45.78	38.14	27.59
1886	44.82	18.72	21.18	30.39	46.04	54.69	63.31	68.68	67.36	61.15	51.84	34.32	20.44
1887	44.82	16.58	21.57	25.55	42.09	60.68	66.53	73.22	66.41	57.95	44.46	35.18	25.57
1888	45.03	15.93	21.65	25.89	42.81	53.40	63.03	70.95	68.05	58.20	46.01	38.73	30.70
1889	47.36	28.18	18.57	35.83	46.04	56.74	63.05	70.69	68.53	61.36	44.59	37.95	36.76
1890	46.99	30.06	30.07	27.47	45.23	52.41	69.93	71.29	65.28	58.06	48.88	38.60	26.65
1891	47.61	26.90	27.33	25.93	47.11	55.40	67.62	66.67	68.16	65.50	49.01	34.57	34.11
1892	45.33	18.72	26.26	28.44	42.50	53.73	66.79	70.87	68.91	61.08	48.87	33.61	24.16
1893	54.64	15.23	20.09	30.61	43.19	54.30	69.05	72.16	63.57	60.40	50.59	36.61	26.88
1894	48.49	27.19	22.37	38.70	46.90	55.24	70.37	73.30	68.74	64.45	50.14	33.09	31.40
1895	46.37	19.04	17.27	27.39	47.23	59.49	70.60	70.10	70.11	65.92	44.54	36.03	28.68
1896	47.89	24.85	24.57	28.11	51.33	64.77	68.12	71.02	69.61	58.57	45.80	38.70	29.24

EXHIBIT 4.—Average Temperature by Year and Months, for each of the Years 1880-96, and the Average for the 17 Years, 1879-95, at the Office of the State Board of Health, State Capitol, Lansing, Michigan.

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 17 Yrs., '79-95	47.24	22.02	23.87	31.30	46.20	57.84	68.23	71.97	68.65	61.92	49.77	36.54	28.53
1880	48.94	36.81	31.62	34.19	47.46	65.48	69.44	71.69	70.38	61.19	48.64	28.78	21.65
1881	49.59	16.98	22.27	30.59	43.23	66.94	65.99	75.41	74.63	71.33	53.63	38.78	35.28
1882	49.23	25.65	35.88	36.14	44.83	53.10	66.86	72.57	71.34	63.64	55.63	39.00	26.13
1883	45.69	17.01	22.07	28.04	43.42	58.28	66.98	70.42	67.78	59.42	48.31	40.09	28.47
1884	47.43	16.48	23.89	32.26	45.30	58.20	70.69	69.77	68.58	67.99	53.47	38.51	26.01
1885	43.01	15.55	10.49	21.57	43.97	55.71	65.26	73.35	63.28	55.86	45.43	38.21	27.14
1886	46.19	19.02	22.44	32.09	50.16	57.77	66.20	70.87	68.49	61.81	51.78	34.02	19.61
1887	46.69	18.26	24.39	27.81	45.27	64.24	69.44	75.73	67.06	58.66	45.19	36.59	27.63
1888	45.49	15.63	22.38	27.49	44.30	53.91	68.80	71.09	67.77	57.79	46.32	39.16	31.19
1889	47.65	29.00	18.89	36.81	46.91	56.99	63.36	70.59	68.46	61.32	44.39	37.71	37.31
1890	47.89	31.63	31.51	28.53	46.86	53.94	71.03	71.81	65.88	57.97	49.09	39.46	27.46
1891	48.27	27.74	29.13	29.59	48.12	56.01	68.27	66.84	68.20	65.87	49.39	34.80	35.23
1892	46.33	19.94	29.91	30.15	44.68	54.91	68.22	71.41	68.59	61.43	49.27	34.11	25.34
1893	46.03	15.06	20.68	32.19	43.98	55.20	69.14	72.14	68.47	60.22	51.19	36.40	27.70
1894	49.00	28.56	22.70	40.48	47.77	56.20	71.04	73.59	67.84	64.21	50.39	33.41	31.78
1895	46.74	18.91	16.98	27.92	48.66	60.52	71.56	70.35	70.20	65.88	44.44	35.86	29.55
1896	48.31	25.01	24.43	28.89	52.71	65.63	68.74	71.28	69.72	58.50	45.81	39.07	29.91

EXHIBIT 5.—Average Temperature by Year and Months, for each of the Years 1864-96, and the Average for the 32 Years, 1864-95, at the Agricultural College, Michigan.

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 32 Yrs., '64-95	46.52	21.76	23.59	30.91	45.85	57.77	67.82	71.31	68.63	60.61	48.14	35.44	26.54
1864.....	47.32	22.26	27.32	31.74	45.86	60.19	67.62	74.52	70.72	59.62	45.74	37.88	24.27
1865.....	48.12	21.10	27.59	39.96	47.40	57.65	70.76	65.60	65.84	67.66	46.50	38.63	27.72
1866.....	45.60	21.16	22.71	29.60	48.94	55.04	66.60	71.72	62.60	55.50	49.50	37.94	25.53
1867.....	46.91	17.61	30.89	29.72	48.20	51.11	71.61	71.60	69.78	56.60	50.60	40.44	25.31
1868.....	46.34	19.00	18.72	37.80	43.68	59.08	68.46	77.19	70.33	58.77	45.19	36.77	21.16
1869.....	46.27	29.38	26.66	27.60	45.70	56.02	64.45	70.35	70.58	63.45	40.80	32.05	28.16
1870.....	49.11	25.37	24.25	30.28	50.39	64.32	70.87	74.40	70.11	63.66	52.45	38.40	24.80
1871.....	47.93	24.75	25.65	38.18	50.13	61.39	68.21	70.60	71.19	58.10	53.91	31.95	21.12
1872.....	45.54	21.59	21.34	24.75	47.39	58.48	71.82	74.91	71.22	62.03	47.44	29.80	15.74
1873.....	44.54	15.87	19.10	28.30	43.17	56.98	70.60	70.82	69.49	57.38	44.68	28.49	29.54
1874.....	47.05	27.70	25.51	32.30	36.87	59.58	70.61	70.02	69.59	62.85	49.10	35.00	26.96
1875.....	43.06	12.87	7.99	26.20	41.11	60.82	66.57	69.67	65.48	58.50	42.93	32.96	31.58
1876.....	46.17	30.22	27.38	30.55	44.16	57.95	68.14	72.48	71.55	56.30	43.74	36.33	15.23
1877.....	47.42	18.07	32.31	24.51	46.16	58.25	65.93	71.43	68.46	61.28	50.83	35.24	36.57
1878.....	48.29	29.11	28.07	40.90	50.55	54.57	64.08	73.04	70.15	63.15	48.33	36.29	21.29
1879.....	46.88	19.19	20.40	33.19	44.84	58.76	66.02	74.03	70.00	56.21	57.28	38.22	27.46
1880.....	47.32	37.10	29.19	35.50	45.87	64.30	67.60	68.04	68.58	55.83	46.23	27.52	22.07
1881.....	48.73	16.98	21.58	30.28	45.59	65.24	64.31	73.43	72.69	69.69	52.51	38.20	34.31
1882.....	47.57	24.89	35.12	35.96	44.70	52.73	66.49	67.71	69.52	59.98	52.67	36.20	24.80
1883.....	43.52	14.39	19.76	24.89	43.48	52.98	65.87	68.94	64.90	56.43	46.17	38.08	26.39
1884.....	45.66	15.46	23.43	29.89	43.66	56.90	68.92	67.95	66.91	65.06	50.91	34.11	24.71
1885.....	42.90	15.34	8.94	21.26	43.59	55.76	64.69	72.70	63.62	58.94	44.95	37.22	27.75
1886.....	46.20	18.78	22.27	31.33	50.18	58.06	65.72	70.68	69.30	62.07	52.37	33.94	19.74
1887.....	46.60	18.20	24.26	28.29	45.37	64.28	68.53	75.51	67.96	58.86	44.97	35.66	27.30
1888.....	45.03	15.40	21.95	27.03	44.03	53.65	67.89	70.53	67.55	57.76	45.70	38.50	30.39
1889.....	47.33	28.04	18.25	36.51	46.59	57.37	62.83	70.19	68.56	61.24	44.19	37.39	36.75
1890.....	47.60	31.54	31.54	28.15	47.08	53.69	70.40	71.04	65.42	57.76	49.11	39.06	26.45
1891.....	47.38	26.70	26.60	29.30	47.40	55.70	67.40	65.30	67.90	65.10	48.80	33.90	34.50
1892.....	45.88	19.19	27.30	29.86	44.50	54.50	67.70	70.29	68.30	60.80	48.30	34.20	25.59
1893.....	44.98	14.80	21.31	28.16	43.50	54.40	66.60	71.50	68.10	58.41	49.70	35.63	27.60
1894.....	48.58	26.88	21.15	40.06	48.44	56.94	71.38	73.22	68.80	63.66	49.80	32.48	30.12
1895.....	46.67	17.50	16.40	27.20	48.37	61.80	71.40	70.50	71.20	66.60	45.00	35.40	28.50
1896.....	47.99	24.65	24.28	28.70	52.64	66.48	69.87	71.83	69.97	57.62	44.61	37.09	28.13

EXHIBIT 6.—*Statements of Meteorological Conditions in the year and in each month of the year 1896, compared with the annual and monthly averages for 1895, and for several stated periods of years. These statements and averages are for Groups of Several Stations in Michigan.*

Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.	Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.
	No. of Years Aver- aged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.			No. of Years Aver- aged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.	
YEAR 1896.				YEAR 1896.			
Av. Temp.	19	+1.64°	+1.52°	<i>Continued.</i>			
Range of Temp.* ...	19	—3°	—5°	Cloudiness	19	+1 per ct.	+6 per ct.
Av. Monthly Range of Temp.*	19	+1°	—2°	Rainfall	19	—2.01 in.	+5.59 in.
Av. Daily Range of Temp.*	17	—59°	—1.70°	Atmospheric Pressure	19	+ .001 in.	+ .012 in.
JANUARY.				FEBRUARY.			
Av. Temp.	19	+3.65°	+5.84°	Av. Temp.	19	+1.34°	+7.30°
Range of Temp.* ...	19	—4°	+8°	Range of Temp.* ...	19	+5°	—1°
Av. Daily Range of Temp.*	17	—4.24°	—3.75°	Av. Daily Range of Temp.*	17	—1.67°	—51°
Cloudiness	19	+9 per ct.	+11 per ct.	Cloudiness	19	+1 per ct.	+8 per ct.
Rainfall	19	—64 in.	—1.34 in.	Rainfall	19	—1.11 in.	+ .62 in.
Atmospheric Pressure	19	+ .056 in.	+ .164 in.	Atmospheric Pressure	19	—1.85 in.	— .147 in.
MARCH.				APRIL.			
Av. Temp.	19	—1.72°	+ .72°	Av. Temp.	19	+6.76°	+4.10°
Range of Temp.* ...	19	+6°	=	Range of Temp.* ...	19	+6°	+15°
Av. Daily Range of Temp.*	17	— .96°	—2.07°	Av. Daily Range of Temp.*	17	+ .23°	—51°
Cloudiness	19	—5 per ct.	+4 per ct.	Cloudiness	19	=	+4 per ct.
Rainfall	19	— .90 in.	+ .32 in.	Rainfall	19	+ .37 in.	+1.40 in.
Atmospheric Pressure	19	+ .017 in.	+ .030 in.	Atmospheric Pressure	19	+ .041 in.	+ .036 in.
MAY.				JUNE.			
Av. Temp.	19	+5.87°	+5.28°	Av. Temp.	19	+1.65°	—2.48°
Range of Temp.* ...	19	—1°	—7°	Range of Temp.* ...	19	— .8°	—8°
Av. Daily Range of Temp.*	17	+1.54°	—59°	Av. Daily Range of Temp.*	17	+ .59°	—2.84°
Cloudiness	19	—9 per ct.	—3 per ct.	Cloudiness	19	—8 per ct.	+3 per ct.
Rainfall	19	— .46 in.	+ .10 in.	Rainfall	19	— .58 in.	+1.79 in.
Atmospheric Pressure	19	— .017 in.	— .057 in.	Atmospheric Pressure	19	+ .008 in.	— .079 in.

* By registering thermometers.

Comments on Exhibit 6 are printed on page 10.

The high temperature for May, and the large amount of rainfall for the year 1896, are especially noticeable.

EXHIBIT 6.—CONTINUED.—*Meteorological Conditions at stations in Michigan, in months for the year 1896, compared with averages for corresponding months in preceding years.*

Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.	Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.
	No. of Years Aver- aged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.			No. of Years Aver- aged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.	
JULY.				AUGUST.			
Av. Temp.....	19	+ .26°	+ .92°	Av. Temp.....	19	+ 1.49°	— .50°
Range of Temp.*...	19	— 2°	— 6°	Range of Temp.*...	19	+ 1°	=
Av. Daily Range of Temp.*.....	17	— 1.68°	— 4.08°	Av. Daily Range of Temp.*.....	17	— .56°	— 2.00°
Cloudiness.....	19	+ 8 per ct.	+ 3 per ct.	Cloudiness.....	19	— 1 per ct.	+ 3 per ct.
Rainfall.....	19	+ 1.32 in.	+ 2.78 in.	Rainfall.....	19	+ .94 in.	+ .72 in.
Atmospheric Pres- sure.....	19	+ .019 in.	+ .009 in.	Atmospheric Pres- sure.....	19	+ .016 in.	+ .075 in.
SEPTEMBER.				OCTOBER.			
Av. Temp.....	19	— 2.99°	— 7.35°	Av. Temp.....	19	— 3.43°	+ 1.26°
Range of Temp.*...	19	+ 1°	— 4°	Range of Temp.*...	19	— 2°	— 8°
Av. Daily Range of Temp.*.....	17	— 1.90°	— 2.76°	Av. Daily Range of Temp.*.....	17	+ 1.09°	— .36°
Cloudiness.....	19	+ 17 per ct.	+ 23 per ct.	Cloudiness.....	19	— 7 per ct.	+ 6 per ct.
Rainfall.....	19	+ 1.84 in.	+ 2.39 in.	Rainfall.....	19	— 1.30 in.	+ .62 in.
Atmospheric Pres- sure.....	19	— .046 in.	— .007 in.	Atmospheric Pres- sure.....	19	— .001 in.	+ .001 in.
NOVEMBER.				DECEMBER.			
Av. Temp.....	19	+ 2.66°	+ 2.67°	Av. Temp.....	19	+ 1.19°	+ .56°
Range of Temp.*...	19	+ 2°	— 3°	Range of Temp.*...	19	+ 7°	— .12°
Av. Daily Range of Temp.*.....	17	+ .54°	— .55°	Av. Daily Range of Temp.*.....	17	— .10°	— .47°
Cloudiness.....	19	+ 8 per ct.	+ 12 per ct.	Cloudiness.....	19	— 3 per ct.	— 2 per ct.
Rainfall.....	19	+ .26 in.	— .10 in.	Rainfall.....	19	— 1.79 in.	— 3.73 in.
Atmospheric Pres- sure.....	19	+ .025 in.	— .026 in.	Atmospheric Pres- sure.....	19	+ .066 in.	+ .142 in.

* By registering thermometers.

EXHIBIT 7.—*Statements of Meteorological Conditions in the year and in each month of the year 1896, compared with annual and monthly averages for 1895, and for several stated periods of years—from observations by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.	Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.
	No. of Years Averaged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.			No. of Years Averaged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.	
YEAR 1896.				YEAR 1896.			
Av. Temp.....	32	+1.47°	+1.32°	<i>Continued.</i>			
Range of Temp.*....	23	+3°	—8°	Cloudiness.....	32	—1 per ct.	+5 per ct.
Av. Monthly Range of Temp.*.....	23	+6°	—3°	Rainfall.....	32	+4.55 in.	+12.50 in.
Av. Daily Range of Temp.*.....	22	—8.33°	—4.99°	Atmospheric Pressure.....	21	—019 in.	—013 in.
JANUARY.				FEBRUARY.			
Av. Temp.....	32	+2.89°	+7.15°	Av. Temp.....	32	+69°	+7.88°
Range of Temp.*....	23	—1°	+8°	Range of Temp.*....	23	+16°	+4°
Av. Daily Range of Temp.*.....	22	+2.24°	—5.00°	Av. Daily Range of Temp.*.....	22	—29°	—1.85°
Cloudiness.....	32	+4 per ct.	+10 per ct.	Cloudiness.....	32	+2 per ct.	+1 per ct.
Rainfall.....	32	—97 in.	—25 in.	Rainfall.....	32	—42 in.	+1.39 in.
Atmospheric Pressure.....	21	+037 in.	+151 in.	Atmospheric Pressure.....	21	—166 in.	—089 in.
MARCH.				APRIL.			
Av. Temp.....	32	—2.21°	+1.50°	Av. Temp.....	32	+6.79°	+4.07°
Range of Temp.*....	23	+5°	—16°	Range of Temp.*....	23	+8°	+7°
Av. Daily Range of Temp.*.....	22	—37°	—3.59°	Av. Daily Range of Temp.*.....	22	+42°	—5.27°
Cloudiness.....	32	—9 per ct.	—2 per ct.	Cloudiness.....	32	—10 per ct.	—3 per ct.
Rainfall.....	32	—1 in.	+1.04 in.	Rainfall.....	32	+39 in.	+2.10 in.
Atmospheric Pressure.....	21	+001 in.	—012 in.	Atmospheric Pressure.....	21	+010 in.	+005 in.
MAY.				JUNE.			
Av. Temp.....	32	+8.71°	+4.63°	Av. Temp.....	32	+2.05°	—1.53°
Range of Temp.*....	23	—4°	—9°	Range of Temp.*....	23	+2°	—9°
Av. Daily Range of Temp.*.....	22	+2.92°	—90°	Av. Daily Range of Temp.*.....	22	+4.57°	—7.54°
Cloudiness.....	32	—10 per ct.	—5 per ct.	Cloudiness.....	32	—5 per ct.	+4 per ct.
Rainfall.....	32	—09 in.	+1.03 in.	Rainfall.....	32	—1.30 in.	+1.59 in.
Atmospheric Pressure.....	21	—011 in.	—063 in.	Atmospheric Pressure.....	21	+001 in.	—091 in.

* By registering thermometers.

Comments on Exhibit 7 are printed on page 10.

The high temperature for May, and the large amount of rainfall for the year 1896, are especially noticeable.

EXHIBIT 7.—CONTINUED.—*Meteorological Conditions at the Agricultural College in months, for the year 1896, compared with averages for corresponding months in preceding years.*

Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.	Meteorological Conditions.	1896 Compared with Averages for Previous Years.		In 1896 More (+), or Less (—), than in 1895.
	No. of Years Aver- aged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.			No. of Years Aver- aged, end'g with 1895.	More (+), or Less (—), in 1896 than the Average for Previous Years.	
JULY.				AUGUST.			
Av. Temp.	32	+52°	+1.33°	Av. Temp.	32	+1.34°	—1.23°
Range of Temp.* ..	23	+7°	—7°	Range of Temp.* ..	23	+4°	—2°
Av. Daily Range of Temp.*	22	—1 22°	—11.05°	Av. Daily Range of Temp.*	22	+1.18°	—5.61°
Cloudiness	32	+9 per ct.	+8 per ct.	Cloudiness	32	=	+4 per ct.
Rainfall	32	+3.74 in.	+5.26 in.	Rainfall	32	+1.96 in.	+0.09 in.
Atmospheric Pres- sure	21	—0.012 in.	—0.032 in.	Atmospheric Pres- sure	21	—0.009 in.	+0.037 in.
SEPTEMBER.				OCTOBER.			
Av. Temp.	32	—2 99°	—8.98°	Av. Temp.	32	—3.53°	—39°
Range of Temp.* ..	23	+6°	—2°	Range of Temp.* ..	23	+1°	—3°
Av. Daily Range of Temp.*	22	—50°	—7.30°	Av. Daily Range of Temp.*	22	+5.46°	+32°
Cloudiness	32	+13 per ct.	+28 per ct.	Cloudiness	32	—16 per ct.	+1 per ct.
Rainfall	22	+4 in.	+5.88 in.	Rainfall	32	—1.40 in.	—35 in.
Atmospheric Pres- sure	21	—0.065 in.	—0.094 in.	Atmospheric Pres- sure	21	+0.002 in.	+0.006 in.
NOVEMBER.				DECEMBER.			
Av. Temp.	32	+1.65°	+1 69°	Av. Temp.	32	+1.59°	—37°
Range of Temp.* ..	23	+5°	—5°	Range of Temp.* ..	23	+18°	—6°
Av. Daily Range of Temp.*	22	+1.16°	—6 50°	Av. Daily Range of Temp.*	22	—77°	—5 51°
Cloudiness	32	+4 per ct.	+8 per ct.	Cloudiness	32	=	+4 per ct.
Rainfall	32	+53 in.	—74 in.	Rainfall	32	—1.19 in.	—4.59 in.
Atmospheric Pres- sure	21	+0.021 in.	—0.010 in.	Atmospheric Pres- sure	21	—0.040 in.	+0.039 in.

* By registering thermometers.

METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1896 IN MICHIGAN.

At the several meteorological stations, in different parts of the State, the average temperature for 1896 was 1.64° higher than the average for the preceding 19 years; the annual range of temperature was 5° less than in 1895 and 3° less than the annual range for the preceding 18 years; the average monthly range of temperature was 2° less than in 1895 and 1° greater than the average for the preceding 19 years. The average daily range of temperature was 1.70° less than in 1895, and .59 less than the average for the preceding 17 years; the average cloudiness was 6 per cent greater than in 1895, and 1 per cent greater than the average for the preceding 19 years; the rainfall (rain and melted snow) was 5.59 inches greater than in 1895, and 2.01 inches less than the average for the preceding 19 years; the average atmospheric pressure was .012 of an inch greater than in 1895, and .001 of an inch greater than the average for the preceding 19 years.

In Exhibit 6, is given by year and months, a comparison of conditions in 1896, in Michigan, with those in 1895, and with the averages of periods of years. Naming the months in order of greatest difference, May, April, January, November, June, August, February, December and July were the months in which the average temperature in 1896 was higher than the average for corresponding months in the preceding 19 years; October, September and March were months in which the average temperature in 1896 was lower than the average for corresponding months in the preceding 19 years.

METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1896 AT ONE CENTRAL STATION.

At the State Agricultural College, near Lansing, and near the center of the thickly-settled part of the State, the average temperature for 1896 was 1.32° higher than in 1895, and 1.47° higher than the average for the preceding 32 years; the annual range of temperature was 8° less than in 1895, and 3° greater than the average for the preceding 23 years; the average monthly range of temperature was 3° less than in 1895, and 6° greater than the average for the preceding 22 years; the average daily range of temperature was 4.99° less than in 1895, and 8.33° less than the average for the preceding 22 years; the average cloudiness was 5 per cent greater than in 1895, and 1 per cent less than the average for the preceding 32 years; the rainfall (rain and melted snow) was 12.50 inches greater than in 1895, and 4.55 inches greater than the average for the preceding 32 years; the average atmospheric pressure was .013 of an inch less than in 1895, and .019 of an inch less than the average for the preceding 22 years.

In Exhibit 7, is given by year and months, a comparison of conditions in 1896, at the Agricultural College, with those in 1895, and with averages for periods of years. Naming the months in the order of greatest difference, May, April, January, June, November, December, August, February and July, were months in which the average temperature in 1896 was higher than the average for corresponding months in the preceding 32 years; October, September and March were months in which the average temperature in 1896 was lower than the average for corresponding months in

the preceding 32 years, at that station which is near the central part of the State.

Whoever will carefully study Diagram I. in this article, and in similar articles for preceding years, will see that thermometers and methods of observation have become so perfect that, given a curve representing correctly the temperature by months at one station in Michigan, curves can readily be constructed without actual records, which will somewhat closely represent the temperature at each of several other stations, because the curves for many stations run so nearly parallel that all that is necessary to do is to find the average difference of mean annual temperature at the station to be represented compared with the station for which the data are given. It may also be seen that a curve representing the temperature at a station in the central part of the State very closely resembles the curve representing the average for many stations representing nearly all parts of the State. This proves that the practice adopted many years ago of stating the meteorological characteristics at one central station is a reasonably safe practice, and it is especially useful when it enables us to gain a comparison for a longer period than can be made from records at many stations, and also when employed in advance of the receipt of records from all stations, as is the case when the weekly bulletins of "Health in Michigan" are issued, for the purposes for which the meteorological conditions at the State Capitol are used to represent the conditions probably prevailing throughout the State.

LOCAL METEOROLOGICAL PHENOMENA IN THE SEVERAL MONTHS OF THE YEAR 1896.

The following general remarks relative to temperature, frosts, effects on vegetation, migration of birds, etc., in 1896, are taken from the monthly reports by observers. The names of stations are appended; the names of observers are stated in Exhibit 1.

JANUARY.

Depth of snow on ground, Jan. 15, 7.9 inches; Jan. 31, 9.7 inches.—*Marquette*.

Depth of snow on ground, Jan. 15, 18 inches; Jan. 31, 8 inches.—*Harrisville*.

Melting snow on ground, Jan. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. Lake frozen. Navigation closed. Small quantity of ice floating in St. Clair river during month. Black river frozen.—*Port Huron*.

Very wet snow, Jan. 18. Did not freeze at night, Jan. 23. The month did not average very cold—only two nights below zero—little frost in the ground—none in the woods, marshes and low grounds where the snow could lie. There was considerable sleighing.—*Thornville*.

Depth of snow on ground, Jan. 15, 3.5 inches; Jan. 31, scattering.—*Adrian*.

Snow on ground, Jan. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16. Melting snow on ground, Jan. 16, 17, 23, 24, 25, 26, 27, 28, 29, 30, 31. Snow fell to depth of 4 inches, Jan. 17, 18, 19.—*Battle Creek*.

Grand River closed second time of season, Jan. 1. Frost, Jan. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31. Depth of snow on ground, Jan. 16, about 4 inches; Jan. 31, immeasurable, a few patches; sleighing gone, Jan. 23.—*Lansing*.

Bees were out, Jan. 17, 27, 29, 30. Sleet, Jan. 22.—*Parkville*.

FEBRUARY.

Depth of snow on ground, Feb. 15, 9.3 inches; Feb. 29, 4.3 inches.—*Marquette*.

Depth of snow on ground, Feb. 15, 15 inches. Feb. 29, snow drifted into heaps, part of ground bare; about 5 inches on ground where covered.—*Harrisville*.

Snow on ground, Feb. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.—*Port Huron*.

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Did not freeze at night, Feb. 27. A good winter month—mostly good sleighing. Not much frost in the ground: ice on lakes and ponds about a foot thick. Considerable high winds.—*Thornville.*

Depth of snow on ground, Feb. 15, $5\frac{1}{2}$ inches; no snow on ground Feb. 29.—*Adrian.*

Melting snow on ground, Feb. 1, 6. Snow fell, Feb. 3, 4, 12, 13, 14, 15, 18, 24.—*Battle Creek.*

Frosts, Feb. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29. Frost out of ground, Feb. 1. Crows heard first time of season, Feb. 10. Depth of snow on ground, Feb. 15, about 6 inches. Sleighing gone, Feb. 26. No snow on ground Feb. 29, except in places where it had drifted.—*Lansing.*

Bees were out Feb. 6, 24, 26, 27. 1.40 inches of precipitation for the month is 2.34 inches below the normal for 17 years. The greatest amount during that period was 8.39 inches in Feb. 1887, and the least amount was 1.13 inches in Feb., 1895; normal, 3.74 inches.—*Parkville.*

MARCH.

Depth of snow on ground, March 15, 7.1 inches; March 31, .3 inches.—*Marquette.*

Very little snow on ground only where drifted, March 15. No snow on ground, March 31.—*Harrisville.*

Ice bridge across foot of Lake Huron broke, March 29. The lake is a field of ice as far as the eye can reach. Snow on ground till March 27.—*Port Huron.*

Froze more or less every night. A cold, dry month—some snow that made sleighing and went off during the few warm days at the last. Wheat looked very well when the snow went off but the lack of rain is making the prospect poor for it.—*Thornville.*

Depth of snow on ground March 15, $1\frac{1}{2}$ inches; no snow on ground March 30.—*Adrian.*

First robin heard, March 19.—*Battle Creek.*

Frosts, March 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. Depth of snow on ground, March 16, immeasurable,—a little in patches. No snow on ground, March 31. Robins first seen, March 8. Grand River open, March 21. Frost out of ground, March 30.—*Lansing.*

Wild geese first seen, March 3; robins, March 14. Bees were out, March 15, 28, 29, 30, 31. Frogs out, March 30.—*Parkville.*

APRIL.

Opening of Navigation, April 22 — *Marquette.*

Light frost, April 22. Killing frost, April 23.—*Port Huron.*

Wild geese flying north, April 16. June berries in blossom, April 22. Apple trees leafing and sweet cherries in blossom, April 25. Dandelions in blossom, April 26. Mandrakes come up, April 28. Plums and peaches in blossom and elm leafing, April 30.

A very early season so far. Vegetation was hardly ever known to make such rapid progress as it has since the 10th of the month. Oats came up so quickly, wheat and grass grew so fast and the trees budded and blossomed so early that all are surprised. Wheat looks well, and can be classified as follows:—One-half, excellent; one-fourth, fair to good; and one-fourth rather poor. What little clover there is, is lovely. Fruit trees, including peaches, are blossoming full.—*Thornville.*

Grass quite green, April 12. Leaves coming out, April 18. Slight frost on roofs of buildings, April 22.—*Battle Creek.*

Light frost, April 22, 23.—*Detroit.*

Frosts, April 2, 3, 4, 5, 6, 7, 8, 22.

Frogs heard, first time of season, April 11. Soft maple, elm and apple about to burst into leaf, April 14. Capitol lawn mowed, first time of season, April 21. Butterfly seen, April 22. Cherry, plum and shad bush in blossom, April 22. Dandelions in bloom, April 24. Lilac in bloom, April 29. Bees seen, April 26. Peach trees in bloom, April 26. Bobolink and Oriole seen, April 27. Apple trees in bloom, April 28. Lilac in bloom, April 29.—*Lansing.*

Ice formed, April, 10, 20, 22. 3.09 inches of precipitation for the month is .40 of an inch below the normal for 17 years.—*Parkville.*

MAY.

Frosts, May 19, 20, 23 — *Marquette.*

Light frosts, May 5, 20 — *Sault Ste. Marie.*

Light frost during night, May 19.—*Port Huron.*

Frost in low places, May 20. Clover blossoms, May 18. Wheat heads, May 23.

The month was a drought till near the close when there was an inch of rain with the cyclone followed by several small rains. Wheat has belied its early promise and is very poor. Oats are stunted in growth and meadows will be no better than they were last year. There is a good prospect for fruit if nothing happens to it.

Brief description of the Cyclone, May 25.

It came very suddenly, at 7 P. M.; the cloud was white; the rushing could be heard for many miles. It struck Lapeer county about the center of Sec. 34, Metamora and followed the south line to the corner of Dryden. In the 2½ miles, 10 houses were blown down and nearly twice as many barns. On both sides of the line—Metamora and Oxford—in that distance 7 persons were killed and 3 or more hurt. After it left the county line at the corner of my township, (Dryden) it blew down 7 good houses and a number of poorer ones. The loss of life was not so great; three being killed in Dryden and three more quite seriously hurt.—*Thornville.*

Light frost, May 20.—*Detroit.*

Trees all in leaf, May 5. Soft maple and elm trees scattering seed, May 9. Fire fly seen and locust heard, first time of season, May 24. No frost observed during the entire month.—*Lansing.*

The total precipitation for the month, 2.93 inches, is 2.16 inches below the normal for 17 years.—*Parkville.*

JUNE.

Light frosts, June 1, 2.—*Port Huron.*

Light frost, morning, June 1. Oats heading, June 20. Haying began, June 21. Cherries ripe, June 22. First wheat cut, June 27.

June was a good month for work and growth of vegetation, which was very satisfactory, except that wheat ripened slowly and unevenly being a little rusty. As the month closes, the prospect for all crops except wheat is very good. That will fall short of a full crop. Oats are immense; hay is twice as good as at first expected and can be called a fair crop; corn looks well and the large acreage of beans and potatoes promise well. The late crops, buckwheat and millet, are in extent much larger than usual and are already sowed. There was never before such a show for fruit,—apples, peaches and plums—as this year.—*Thornville.*

Light frost, June 16. Harvest began, June 18. Drought beginning to make itself felt. Grasshoppers doing some damage.

2.70 inches of precipitation for the month is 1.41 inches below the normal for 17 years.—*Parkville.*

JULY.

A hot month with heavy rainfall; bad for the harvesting of oats and the growth of weeds. The oats are smuttier than ever seen before, the crop though is immense if it can be saved. Wheat threshing shows that the yield and quality are both poor. All other crops promise well, fruit of all kinds especially. The season is notably early.—*Thornville.*

Heavy dews prevailed during the month.—*Lansing.*

AUGUST.

Light frost, August 31.—*Sault Ste. Marie.*

Frost, August 28, slight—killing some corn on low grounds.

August was notable for its heavy rainfall and thunder storms. With the exception of a heated term in the forepart of the month, the weather was quite cool and extremely favorable for work. Crops, so far as harvested and trashed, are mostly good. Wheat was short on account of winter killing; hay was good; oats are very rusty but the crop is immense; rye better than ever known. Of crops not harvested, corn, beans and buckwheat, promise well. Potatoes not so well on account of the weeds, the growth of which was fostered by the wet weather; some fields, too, having been struck with the blight during the heated term. All kinds of fruit are abundant and of good quality.—*Thornville.*

Katydid first heard, August 7. Hail, night of August 9; light, no damage.—*Lansing.*

Light frost, August 28; no damage.—*Parkville.*

SEPTEMBER.

Light frost, September 1, 4, 20. Killing, September 22, 27, 28.—*Sault Ste. Marie.*

First frost, light, Sept. 20. Heavy frost, Sept. 23; killed all kinds of tender vegetation. Robins were seen leaving as late as Sept. 29; all other kinds seem to be entirely gone.

The month was wet and cool towards the last. It was so wet that it hindered work materially, delayed seeding and made the curing of beans difficult; they are not all secured yet. The corn crop is large but the smuttiest ever seen; it was mostly cut by the frost. Potatoes are not dug; the crop is poor and very weedy. There is a splendid crop of apples to pick.—*Thornville.*

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Frost, Sept. 20, 23.—*Alma*.

First light frost, Sept. 4. First heavy frost, Sept. 20. First killing frost, Sept. 23.—*Port Huron*.

Heavy frost, Sept. 21, 23.—*Ann Arbor*.

Frosts, Sept. 20, 23.—*Battle Creek*.

Frost, heavy, Sept. 20. Killing frost, Sept. 23.—*Detroit*.

Light frost, first of season, Sept. 20. Light frost, Sept. 28. Heavy frost, Sept. 23. Ground froze first time of season, Sept. 22.—*Lansing*.

Light frost, Sept. 1, 4, 20, 24. Killing frost, Sept. 23.—*Parkville*.

OCTOBER.

Frost, Oct. 2, 8, 12.—*Marquette*.

Nights that did not freeze, Oct. 4, 5, 12, 27, 28, 29, 30.

A dry, pleasant month, with cold nights; very favorable for work but not for the growth of wheat, which has a very small top, not well fitted to go into winter quarters. With regard to the corn and oat crop, both of which were very abundant, it is to be noted that they were never observed to be so smutty as they are this fall.—*Thornville*.

First light snow of the season, Oct. 17. First ice formed, Oct. 18.—*Port Huron*.

Ice formed on wet bulb of psychrometer in A. M., and P. M., Oct. 18. First light snow, Oct. 19.—*Alma*.

Heavy frost, Oct. 9, 11, 22, 25.—*Ann Arbor*.

Light frost, Oct. 2, 3, 4, 11, 12, 14, 15, 16, 17, 20, 21, 25, 26, 31. Killing frost, Oct. 8, 9, 18, 19, 22, 23, 24. Snow first observed, Oct. 17. Wild geese flying south, Oct. 22, 25.—*Lansing*.

Wild geese seen Oct. 17. Frost nearly every day of the month.

0.84 of an inch of precipitation for Oct. is 2.27 inches below the normal for 17 years. The greatest amount during that time was 8.12 inches in Oct., 1891, and the least amount was 0.63 of an inch in Oct., 1892. Normal, 3.11 inches.—*Parkville*.

NOVEMBER.

Depth of snow on ground Nov. 15, 21 inches. Nov. 30, 0.2 inches.—*Marquette*.

First cold wave of season, Nov. 28.—*Port Huron*.

Nights that did not freeze, Nov. 4, 15, 16, 17, 23, 24, 25, 26.

A cold, windy, dry month with a few unseasonable warm days toward the close.—*Thornville*.

Winter set in, on Nov. 28.—*Parkville*.

Light frost, Nov. 1, 2. Hard frost, Nov. 8, 9, 10, 12, 13, 14, 19, 20, 21, 22, 23, 27, 28, 29, 30. Ground froze, Nov. 8, 19, 27. "Indian Summer" days, 15, 16, 17, 18, 24, 25, 26. Ice formed first time on Grand River, Nov. 30.—*Lansing*.

DECEMBER.

Depth of snow on ground Dec. 15, 0.1 inch; Dec. 31, 2.2 inches. Navigation closed, Dec. 7.—*Marquette*.

Navigation closed on Lake Huron, and Black River frozen an inch thick, Dec. 21. Thin ice began floating on St. Clair River, Dec. 23. Navigation closed, Dec. 25. Snow on ground Dec. 1, 4, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31.—*Port Huron*.

December was not a very severely cold month. There was no sleighing and as the month closes there is no frost in the ground and ponds, lakes and streams are all open.—*Thornville*.

Depth of snow on the ground, Dec. 15, 7 inches. Dec. 31, 1 inch.—*Adrian*.

Bees were out on Dec. 12.

The total precipitation for the year was 38.54 inches, which is 3.85 inches below the normal for 17 years. The greatest was 56.81 inches in 1893 and the least was 30.71 inches in 1894; normal, 42.39 inches.—*Parkville*.

Light frost, Dec. 7, 8, 9, 10, 11. Heavy frost, Dec. 1, 2, 3, 4, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27.

Grand River frozen across in places, Dec. 1; free from ice, Dec. 9; closed, Dec. 21, second time; opened, Dec. 31.

Ground frozen, Dec. 1. Frost out of ground, Dec. 12.

Ground froze, Dec. 13.

Depth of snow on ground, Dec. 15, 1¼ inches. No snow on ground, Dec. 31.—*Lansing*.

Inches of Rainfall and Snowfall by Year and Months, for each of the 15 Years, 1882-96, at Traverse City, Michigan. S. E. Wait, Observer.

	1882.			1883.			1884.			1885.			1886.			1887.			1888.			1889.		
	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.
Year.....	32.33	117.50	45.26	31.23	101.80	43.42	29.07	108.45	42.58	22.74	132.50	37.91	26.51	127.30	42.75	16.80	131.50	33.06	24.54	48.50	36.23	23.86	92.50	35.65
January....	.36	26.25	3.99	.....	39.00	3.97	.....	29.45	3.19	.....	36.50	4.87	.69	47.00	5.49	.....	41.50	4.66	.....	3.75	3.97	.43	17.50	2.67
February....	1.45	26.50	2.99	.....	17.00	2.31	.....	26.25	3.07	.....	17.00	1.78	.50	16.50	2.51	2.41	33.00	5.91	.33	15.50	1.82	.97	37.50	4.38
March.....	1.89	12.75	3.30	.....	14.00	1.40	1.79	3.25	2.27	.....	20.00	2.29	1.70	13.50	4.60	.18	17.50	2.27	1.70	18.00	4.33	.20	12.50	1.35
April.....	2.92	1.00	3.02	1.44	1.30	2.14	.72	9.00	2.17	1.75	13.00	2.12	2.08	3.00	2.48	.69	2.50	.98	2.11	6.50	3.26	1.39	3.00	2.97
May.....	2.29	.....	2.29	6.67	.....	6.67	2.06	.50	2.11	3.02	.....	3.02	2.49	.....	2.49	.74	.....	.74	3.97	.....	3.97	3.82	.....	3.82
June.....	5.00	.....	5.00	4.90	.....	4.90	2.79	.....	2.79	1.69	.....	1.69	.97	.....	.97	3.65	.....	3.65	.66	.....	.66	4.16	.....	4.16
July.....	1.86	.....	1.86	6.52	.....	6.52	5.78	.....	5.78	2.30	.....	2.30	.85	.....	.85	2.70	.....	2.70	2.50	.....	2.50	2.36	.....	2.36
August.....	6.48	.....	6.48	1.84	.....	1.84	2.35	.....	2.35	6.95	.....	6.95	4.20	.....	4.20	1.66	.....	1.66	2.23	.....	2.23	1.26	.....	1.26
September..	1.36	.....	1.36	2.76	.....	2.76	4.50	.....	4.50	2.21	.....	2.21	7.61	.30	7.61	.61	.....	.61	6.14	.....	6.14	4.81	.....	4.81
October....	3.62	.....	3.62	3.42	.....	3.42	5.12	3.00	5.74	2.82	.....	2.82	4.57	.....	4.57	2.92	1.00	4.09	2.03	.....	2.03	.60	.....	.60
November..	4.32	10.00	5.77	2.87	11.00	4.71	1.51	12.50	2.91	1.66	11.50	2.85	.48	23.50	3.82	.67	6.00	1.92	2.35	1.00	2.73	2.12	15.00	3.23
December..	.18	41.00	4.98	.81	19.50	2.78	2.45	24.50	5.70	.34	31.50	4.01	.37	23.50	3.16	.57	30.00	3.84	.52	3.75	2.59	1.71	7.00	4.04

Inches of Rainfall and Snowfall by Year and Months, for each of the 15 Years, 1882-96, at Traverse City, Michigan. S. E. Wait, Observer.—CONCLUDED.

	1890.			1891.			1892.			1893.			1894.			1895.			1896.		
	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.	Rainfall.	Snowfall.	Total precipitation.
Year.....	23.65	102.00	35.25	26.15	86.25	32.40	30.31	85.00	35.72	26.20	139.50	38.02	24.96	66.00	32.73	22.52	111.00	31.11	32.81	74.25	35.32
January.....	.57	22.50	4.81	.30	14.50	1.98	2.92	22.50	2.92	.....	39.50	3.84	1.20	17.00	3.31	4.40	43.00	4.40	2.24	16.00	2.24
February.....	.....	30.50	3.00	3.05	29.50	3.05	.40	17.50	2.17	.28	26.50	2.88	.....	11.50	1.28	2.14	20.00	2.14	2.54	31.00	2.54
March.....	7.73	17.00	3.00	.28	19.00	2.16	1.45	12.50	1.45	1.31	8.00	2.11	2.53	5.50	3.28	.85	12.50	2.13	.85	9.00	2.01
April.....	2.39	.50	2.50	.90	1.50	1.05	2.35	.50	2.40	3.80	2.00	4.08	1.09	3.50	2.18	1.55	.....	1.55	2.00	2.00	2.20
May.....	1.96	.....	1.96	1.05	.....	1.05	4.28	.....	4.28	1.95	.....	1.95	5.39	2.00	5.89	2.96	12.00	5.01	6.01	.....	6.01
June.....	1.86	.....	1.86	1.37	.....	1.37	4.32	.....	4.32	1.32	.....	1.52	3.70	.....	3.70	.76	.....	.76	1.60	.....	1.60
July.....	3.12	.....	3.12	.89	.....	.89	2.40	.....	2.40	5.08	.....	5.08	1.13	.....	1.13	.41	.....	.41	3.22	.....	3.22
August.....	3.98	.....	3.98	3.46	.....	3.46	4.15	.....	4.15	.47	.....	.47	.78	.....	.78	3.33	.....	3.33	1.28	.....	1.28
September.....	1.42	.....	1.42	2.43	.....	2.43	2.25	.....	2.25	3.80	.....	3.80	2.82	.....	2.82	2.51	.....	2.51	6.07	.....	6.07
October.....	4.21	2.00	4.48	3.07	.....	3.07	2.30	.....	2.30	4.34	.50	4.61	4.08	.....	4.08	1.17	7.50	2.21	1.03	.75	1.10
November.....	1.20	9.00	2.91	5.07	20.25	7.46	2.42	15.00	4.06	2.65	23.50	3.00	1.81	15.50	2.82	.86	23.50	3.13	5.34	9.00	6.42
December.....	2.21	20.50	2.21	4.28	1.50	4.43	1.67	17.00	3.02	1.00	39.50	4.68	.43	11.00	1.46	1.55	22.50	3.50	.63	6.50	.63

Remarks by Mr. S. E. Wait, Traverse City.

The greatest annual snowfall was in 1895—141 inches. The smallest was in 1888—48.5 inches. The average was 103.5 inches. The greatest precipitation—rain and melted snow—was in 1882—45.27 inches; the smallest was in 1895—31.11 inches. Average 37.26 inches. On September 23rd and 24th, 1896, over five inches of rain fell in 36 hours. In a continuous snow storm from November 29th to December 15th, 1892, over four feet of snow fell.

Remarks by Mr. Bates, Editor of Herald, Traverse City, Mich.

The above table will make an interesting study to all who care for such things. It has been often said that when a season has given a heavy rainfall the following winter will give a light snowfall. This, the table will show, has not always been the case. For fear that some at a distance will think a mistake has been made in giving a foot of snow to May, 1895, we would say that a tremendous snowfall came on the 13th day of May in that year, after the leaves were green upon the trees. It was a most wonderful and beautiful sight, but made sad havoc of blossoming fruit trees and starting buds.

One very interesting feature in the report above is the snowfall for each winter during the period covered by the report. This is found to be as follows:

	Inches.		Inches.
1882-83.....	122.30	1889-90.....	92.50
1883-84.....	98.95	1890-91.....	96.00
1884-85.....	126.50	1891-92.....	74.75
1885-86.....	126.00	1892-93.....	108.00
1886-87.....	141.80	1893-94.....	103.00
1887-88.....	80.75	1894-95.....	114.00
1888-89.....	75.25	1895-96.....	111.50

The average snowfall for the last fourteen winters has been 105.90 inches.

The more the table is studied the more interesting it becomes, and many facts of value may be deduced from it. In the fifteen years given, 1896 had the greatest rainfall, and, as we all know, was the most fruitful year. The precipitation was large in May of this year, with a fair fall in July. In contrast to this is the "bad year" of 1887 with its less than half that amount of rain, with little more than an inch and a half of fall in the three spring months. The heavy winter snows so characteristic of the Grand Traverse region in earlier years dropped suddenly in 1888, but 1893 to 1896 brought them up again to something more like the old standard, which goes to refute the theory that our snowfall is permanently decreasing. These are only samples of the interesting facts to be brought out in a study of this valuable record, which should be kept for future reference, with the hope that Mr. Wait will not fail in adding to it for many years to come.

MEASUREMENTS AND TEMPERATURE OF GROUND WATER.

In a paper entitled "Typhoid Fever and Low Water in Wells," on pages 89-114 of the Annual Report of this Office for 1884, it is shown that for the years 1878-82 there was a relation between the sickness and deaths from typhoid fever in Michigan and the depth of water in wells. In the month of October, when the water in wells reached the lowest point in the year, there were the most deaths and sickness from typhoid fever; and following the month of April, when the water in wells was highest, there were the least deaths and sickness from typhoid fever. When this comparison is made in a diagram, it is found that, "beginning with June in each year the curve representing sickness from typhoid fever follows more or less closely the curve representing the average depth of earth above the ground water."

On page 256, of the Report of this Board for the year 1889, is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the 10 years, 1878 and 1880-88.

On page 229 of the Report for 1891 also on page 226 of the Report for 1892, is a diagram exhibiting the relation of typhoid fever to low water in wells in Michigan, for the 12 years, 1878 and 1880-90.

On page 271 of the Report for 1893 and on page 300 of the Report for 1894, and on page 322 of the Report for 1895 and on page 326 of the Report for 1896, is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the fourteen years, 1878 and 1880-92.

Typhoid fever being one of the most important causes of death in Michigan, it is of very great importance that further evidence be collected on this important subject.

The measurements by months in 1896, of the depth of a well at each of five places in Michigan, are shown in Exhibit 8; also the depth of earth above the water, and the temperature of the water in each of the wells. It is hoped that these measurements and observations may continue, and permit a more extended comparison of the depth of water in wells with the sickness from typhoid fever, and with sickness and deaths from other diseases.

CHANGE OF EXPOSURE OF INSTRUMENTS AT LANSING IN 1884.

Comments on the subject of a new instrument shelter at Lansing are printed on page 21, Report for 1885. Exhibits A, B, C, and D, pages 22 and 23, of the Report of 1886, relate to that subject, and may be studied in connection with what is said on page 21, Report for 1885. The fact of the change of place of observation in 1884 may need to be taken into account by whoever studies the meteorology at Lansing through a long series of years.

EXHIBIT 8.—Depth of Wells; Depth of Ground above Water in Well; Temperature of water in Well, and day of observation of such temperature, in each month of the year 1896; as reported by Meteorological observers for the State Board of Health, and for the United States Weather Bureau.

Stations in Michigan.	January.			February.			March.			April.			May.			June.		
	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.
Traverse City*	55	42 2	47 ²²	55	26 11½	47 ²²	55	26 11½	47 ²²	55	26 11½	47 ²²	55	26 11½	47 ²²	55	26 11½	47 ²²
Laansing, S. B. of H.	26 11½	26 11½	35 16	† 26 11½	26 11½	46 ¹⁶	26 9	26 9	46 ¹⁶	26 11½	26 8½	49 ¹⁵	26 9	26 9	51 ¹⁸	26 7¼	26 7¼	51 ¹⁵
Ann Arbor	47	15	46 ¹⁵	17	13 8	44 ¹⁵	17	13 4	44 ¹⁶	17	12	54 ¹⁵	17	11 8	45 ¹⁵	60	54 6	45 ¹⁵
Battle Creek	60	55 10	16	60	57 6	18	60	57 6	18	60 10	35 7	51 ¹⁹	60	57 7	50 ¹⁷	60	54 6	50 ¹⁷
Hillsdale	30 6	24 6	46 ¹⁶	30 6	23 8	48 ¹⁵	30 6	22 8½	48 ¹⁵	30 6	22 9½	50 ¹⁵	30 6	23 11	50 ¹⁵	30 6	22 7½	50 ¹⁵

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

* At Northern Michigan Asylum, W. L. Miller, observer.

† Well dry,—severe drought.

EXHIBIT 8.—*Depth of Wells, etc.*—CONTINUED.

Stations in Michigan.	July.			August.			September.			October.			November.			December.		
	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.
Traverse City*	55	41 6	47 ²¹	55	43 10	47 ²³	55	26 11½	53 ¹⁵	26 11½	26 3½	52 ¹⁰	55	26 11½	54 ¹⁶	41 6	26 1	49 ²⁴
Lansing, S. B. of H.	26 11½	26 8	51 ¹⁷	26 11½	26 6½	53 ¹⁵	26 11½	26 4½	53 ¹⁶	26 11½	26 3½	52 ¹⁶	26 11½	26 1	54 ¹⁶	26 1	26 1	51 ¹⁶
Ann Arbor	17	8 6	53 ¹⁵	17	10 10	55 ¹⁵	17	11 8	54 ¹⁶	17	10	54 ¹⁷	17	12 6	53 ¹⁶	12 8	12 8	48 ¹⁶
Battle Creek	30 6	26 2	50 ¹⁵	30 6	53 3	17	30 6	53 9	17	61	54 6	54 ²³	30 6	54 11	54 ²²	56 9	56 9	48 ²²
Hillsdale	30 6	26 2	50 ¹⁵	30 6	21 3½	50 ¹⁶	30 6	22 6	51 ¹⁵	30 6	22 2	52 ¹⁵	30 6	23 5	52 ¹⁶	20 10	20 10	50 ¹⁶

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

* At Northern Michigan Asylum, W. L. Miller, observer.

TEMPERATURE OF THE ATMOSPHERE.

Compared with the average for the preceding 32 years at the Agricultural College, the temperature for May was high. A comparison, by months in the preceding 32 years, 1864-95, at the Agricultural College, near Lansing, is given in Exhibit 10.

The average temperature, by months, for the 17 years, 1879-95, at Lansing, and a comparison of 1896, by months, with that average, are stated in Exhibit 11.

The average temperatures at each of 11 stations in Michigan, and the average for 10 stations in 1896, and in each month of that year, are stated in Table I.

EXHIBIT 9.—Average Temperature by Year and months in 1896,* compared with Annual and Monthly Averages for 1895, and for the 19 years, 1877-95. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Average Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 years, 1877-95	46.25	21.23	23.23	29.83	44.57	55.90	66.47	70.76	68.12	61.56	49.23	36.04	28.05
Av. 17 years, 1879-95	45.93	21.01	22.31	29.35	43.96	55.84	66.49	70.44	67.81	61.28	48.97	35.81	27.85
1895 (10 stations)...	46.37	19.04	17.27	27.39	47.23	59.49	70.60	70.10	70.11	65.92	44.54	36.03	28.68
1896 (10 stations)...	47.89	24.88	24.57	28.11	51.33	64.77	68.12	71.02	69.61	58.57	45.80	35.70	29.24
In 1896 Higher than Av. for 19 years, 1877-95.....	1.64	3.65	1.34	.....	6.76	8.87	1.65	.26	1.49	.....	.....	2.66	1.19
In 1896 Lower than Av. for 19 years, 1877-95.....	.....	.....	.....	1.72	.....	.....	.....	.....	.....	2.99	3.43	.....	.....
In 1896 Higher than in 1895.....	1.52	5.84	7.30	.72	4.10	5.28	.....	.92	.....	.....	1.26	2.67	.56
In 1896 Lower than in 1895.....	.....	.....	.....	.....	.....	.....	2.48	.....	.50	7.35	.....	.....	.....

NOTE.—The stations represented in the lines for average temperature for the years 1877-94 in Exhibit 9, are the following: Port Austin for 1855, 1885, 1889; Mendon for 1877-82; Nirvana for 1877-79 and first four months of 1880; Reed City for the last eight months of 1880 and 1881-85; Kalamazoo for 1877-89; Coldwater, Ypsilanti, Woodmere Cemetery (near Detroit), for 1877-79; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Washington for 1879-83; Benton Harbor for 1877-78; Petoskey for 1878-79; Parkville for 1881-82; Hillsdale for 1882-84; Winfield for 1881-1883; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Ionia for 1883-85; Manistique, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Muskegon, Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Otsego for 1887-90; Alma for 1890; Marshall for 1882-92; Gulliver Lake for 1887-90, 1892; Albion for 1890-91; Rockland for 1891-92, 1894; Battle Creek for 1877-80, 1882, 1885, 1888-9, 1891-96; Tecumseh for 1877-85, 1888-89, 1892-96; Harrisville for 1881-82, 1885-86, 1890-96; Thornville for 1877-96; Lansing for 1879-96; Agr'l College for 1877, 1881-96; Ann Arbor for 1881-96; Traverse City for 1882-96; Birmingham for 1887-96; Adrian for 1894-96.

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 9, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

TABLE I.—Average Temperature in Degrees Fahr., for the Year, and for each Month of the Year 1896, at each of 10 stations in Michigan, and also average line for the 10 stations. From observations made daily at 7 A. M., 2 P. M. and 9 P. M.,* local time, by observers† for the State Board of Health.

Stations in Michigan. †	Divisions of the State. ‡	Temperature in Degrees Fahr.													
		Year.		Months, †† 1896.											
				Norm. **	1896.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 10 Stations§			47.89	24.88	24.57	28.11	51.33	64.77	68.12	71.02	69.61	58.57	45.80	38.70	29.24
Rockland -----	U. P.		¶	f	f	f	e	b	f		i	h	g		c
Traverse City -----	N. W.	44.24 ¹⁴	46.38	24.69 ^a	23.37	25.40	48.77	60.12	67.16	69.60	70.11	56.73	45.42	35.99	29.16
Harrisville -----	N. E.	42.71 ⁸	43.77	21.96	21.25	23.80	42.67	56.80	61.66	66.35	67.27	56.46	44.14	35.68	27.24
Thornville -----	B. & E.	47.91 ²⁰	48.95	25.61	24.86	28.16	52.56	67.24	70.03	72.59	70.46	60.60	46.13	39.72	29.39
Agr'l College -----	C.	46.56 ³³	47.99	24.65	24.28	28.70	52.64	66.48	69.87	71.83	69.97	57.62	44.61	37.09	28.13
Lansing, S. B. of H. ‡	C.	47.30 ¹⁸	48.31	25.01	24.43	28.89	52.71	65.63	68.74	71.28	69.72	58.50	45.81	39.07	29.91
Adrian -----	S. C.	48.73 ³	48.63	24.54	25.80	29.27	52.93	65.56	68.36	71.62	70.15	59.17	46.59	40.53	29.04
Ann Arbor -----	S. C.	46.95 ¹⁶	48.41	25.90	25.40	28.80	51.80	66.20	68.26	71.70	69.00	58.06	46.10	39.60	30.10
Battle Creek -----	S. C.	49.51 ⁶	49.62	24.86	25.07	30.14	54.38	67.29	69.98	72.54	71.82	60.09	47.58	40.12	31.28
Tecumseh -----	S. C.	47.35 ⁵	47.87	25.10 ^a	25.30	29.01	52.00	64.94 ^b	67.72	70.17	68.78 ^b	58.20 ^g	45.04 ^b	39.88 ^b	28.29 ^a
Birmingham -----	S. E.	47.79 ¹⁰	49.01	26.47	25.95	28.89	52.87	67.45	69.46	72.18	68.81	60.26	46.58	39.31	29.90

* The daily averages are one-third the sum of these three observations.

† The names of observers, their place of observation, and the counties in which these places are situated, are stated in Exhibit I.

§ This line is an average for only the 10 stations from which statements nearly complete were received for every month of the year. It does not include Rockland.

** Numbers in this column state the average annual temperature for periods of years ending in each case with December 31, 1896. The small figures above and at the right of numbers which state the temperature, denote the number of years included in the average.

†† The computations for Av. Temp., as tabulated for months in 1896, were made at the following station: Ann Arbor. All other computations in Table I. were made at the office of the State Board of Health.

‡ Beginning with the year 1885, allowance must be made for Lansing in Table I. because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

§§ The names of divisions, and the counties in each, are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

¶ The average for 11 months is 43.60.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days. h For 23 days. i For 20 days.

The average line and lines for 8 representative stations in Table I. are graphically represented in Diagram I.

DIAGRAM 1.-AVERAGE TEMPERATURE BY MONTHS, 1896.

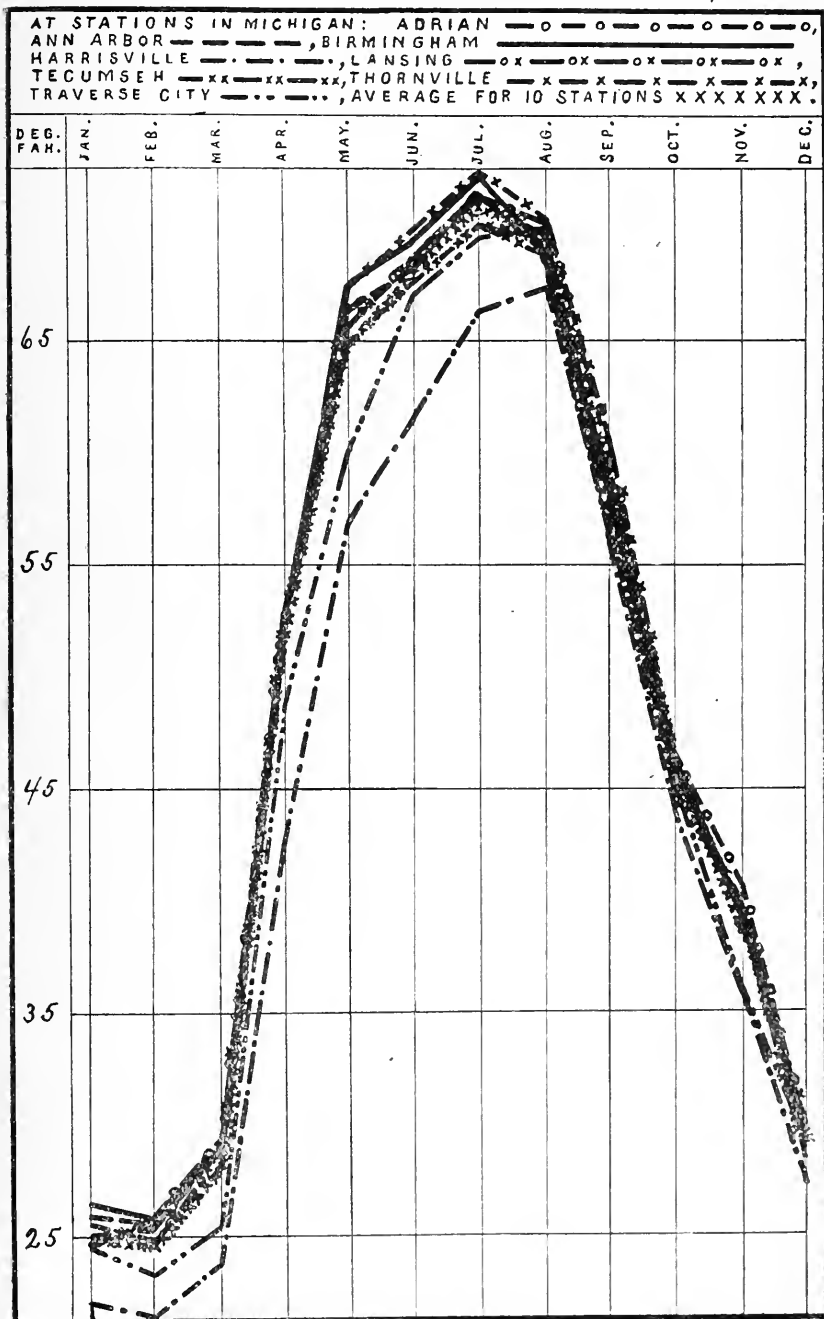


EXHIBIT 10.—*Comparison of the Average Temperature during the Year and during each month of the year 1896, with the Annual and with the Monthly Averages for the Year 1895, and with the Averages for the 32 Years, 1864-95. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Years, etc.	Average Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 32 years, 1864-95	46.52	21.76	23.59	30.91	45.85	57.77	67.82	71.31	68.63	60.61	48.14	35.44	26.54
1895.....	46.67	17.50	16.40	27.20	48.57	61.80	71.40	70.50	71.20	66.60	45.00	35.40	28.50
1896.....	47.99	24.65	24.28	28.70	52.64	66.48	69.87	71.83	69.97	57.62	44.61	37.09	28.13
In 1896 Higher than Av. for 32 years, 1864-95	1.47	2.89	.69	-----	6.79	8.71	2.05	.52	1.34	-----	-----	1.65	1.59
In 1896 Lower than Av. for 32 years, 1864-95.....	-----	-----	-----	2.21	-----	-----	-----	-----	-----	2.99	3.53	-----	-----
In 1896 Higher than in 1895.....	1.32	7.15	7.88	1.50	4.07	4.68	-----	1.33	-----	-----	-----	1.69	-----
In 1896 Lower than in 1895.....	-----	-----	-----	-----	-----	-----	1.53	-----	1.23	8.98	.39	-----	.37

EXHIBIT 11.—*Average Temperature by Year and Months in 1896* compared with Annual and Monthly Averages for 1895, and for the 17 Years, 1879-95. Observations made at office State Board of Health, State Capitol, Lansing, Michigan.*

Years, etc.	Average Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 17 years, 1879-95	47.24	22.02	23.87	31.30	46.20	57.84	68.23	71.97	68.65	61.92	49.77	36.54	28.53
1895.....	46.74	18.91	16.98	27.92	48.66	60.52	71.56	70.35	70.20	65.88	44.44	35.86	29.55
1896.....	48.31	25.01	24.43	28.89	52.71	65.63	68.74	71.28	69.72	58.50	45.81	39.07	29.91
In 1896 Higher than Av. for 17 years, 1879-95	1.07	2.99	.56	-----	6.51	7.79	.51	-----	1.07	-----	-----	2.53	1.38
In 1896 Lower than Av. for 17 years, 1879-95	-----	-----	-----	2.41	-----	-----	-----	.69	-----	3.42	3.96	-----	-----
In 1896 Higher than in 1895	1.57	6.10	7.45	.97	4.05	5.11	-----	.93	-----	-----	1.87	3.21	.36
In 1896 Lower than in 1895	-----	-----	-----	-----	-----	-----	2.82	-----	.48	7.38	-----	-----	-----

* Beginning with the year 1885, slight allowance should be made for Lansing in Exhibit 11, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

EXHIBIT 12.—*Average Temperature in Degrees Fahr., for the year and months, 1896, at Office State Board of Health, State Capitol, Lansing, Michigan, computed from readings at 7 A. M., 2 P. M. and 9 P. M., daily, from registers of the Draper self-Recording Thermometer, compared with observations made with Green's Standard mercurial Thermometer at the same hours; both thermometers placed in double latticed shelter for instruments, in the southwest part of the Capitol yard.*

Tri-daily readings of instruments specified.	Year.	Average Temperature, in Degrees Fahr.—Year and Months, 1896.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Temp. from tri-daily observations with Green's Standard Mercurial Thermometer	48.31	25.01	24.43	28.89	52.71	65.63	68.74	71.28	69.72	58.50	45.81	39.07	29.91
Av. Temp. computed from readings of the Draper's Self-Recording Thermometer	48.32	26.31	24.45	29.20	50.46	65.04	67.68	70.28	68.92	58.80	47.34	39.62	31.74
Higher by Draper's than by Green's Thermometer .....	.01	1.30	.05	.31						.30	1.53	.55	1.83
Lower by Draper's than by Green's Thermometer					2.25	.59	1.06	1.00	.80				

EXHIBIT 13.—*Average Daily Range of Temperature, by Year and Months in 1896, compared with Annual and Monthly Averages for 1895, and for the 17 years, 1879-95. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Average Daily Range of Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept	Oct.	Nov.	Dec.
Av. 17 years, 1879-95*	18.07	15.73	17.23	17.44	19.16	20.28	20.68	21.18	20.49	20.12	17.19	14.10	13.22
1895 (17 stations)...	19.18	15.24	16.07	18.55	19.90	22.41	24.11	23.58	21.93	20.98	18.64	15.19	13.59
1896 (16 stations)...	17.48	11.49	15.56	16.48	19.39	21.82	21.27	19.50	19.93	18.22	18.25	14.64	13.12
In 1896 Greater than Av. for 17 years, 1879-95					.23	1.54	.59				1.09	.54	
In 1896 Less than Av. for 17 years, 1879-95.....	.59	4.24	1.67	.96				1.68	.56	1.90			.10
In 1896 Greater than in 1895.....													
In 1896 Less than in 1895.....	1.70	3.75	.51	2.07	.51	.59	2.84	4.08	2.00	2.76	.36	.55	.47

* Otisville for 1879-80, 1882; Escanaba for 1880-87; Marshall for 1882-92; Reed City for 1882, 1884-85; Kalamazoo for 1880-83, 1886-90, 1892-95; Washington for 1882-83; Winfield for 1883; Manistique, Ionia, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Hillsdale for 1884; Pentwater, East Saginaw, Hudson for 1886; Port Austin for 1888-89; Gulliver Lake for 1887-90, 1892; Alma, Otsego for 1890; Albion for 1890-91; Manistee for 1889-92; Battle Creek for 1879-80, 1888-89, 1891; Tecumseh for 1883-85, 1892-96; Adrian for 1880, 1894-96; Marquette for 1879-84, 1886-96; Grand Haven for 1879-88, 1890-96; Detroit, Lansing for 1879-96; Alpena, Port Huron, Thornville for 1880-96; Agricultural College for 1881-96; Traverse City for 1882-96; Harrisville for 1882, 1885-96; Birmingham for 1887, 1889-96; Rockland for 1891, 1892, 1894-96; Sault Ste. Marie for 1892-96.

TABLE II.—*Extremes of Temperature and Days of Month on which the Highest and Range for the Year 1896, at each of 16 Stations in Michigan.—As indicated by daily 2 P. M. and 9 P. M., by Observers* for the State Board of Health, and for the U. S.*

Line number.	Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics.)	Year, 1896.			January.		February.		March.		April.		May.	
		Highest.	Lowest.	Range.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1	At 16 Stations†-----	98	-25	123	45	-25	59	-22	69	-16	87	7	98	33
2	Rockland ‡-----	95	-17	112	40 ²²	-17 ⁵	58 ²⁷	-16 ²⁰	55 ²⁷	-5 ¹¹	84 ²⁷	7 ²	94 ⁷	35 ²⁰
3	Marquette §-----	96	-13	109	36 ³¹	-13 ⁴	55 ²⁷	-8 ¹⁹	49 ³⁰	11 ²³	70 ²⁷	10 ²	96 ⁷	33 ²⁰
4	Sault Ste. Marie ...	89	-25	114	11 ³¹	-25 ⁵	40 ²⁷	-18 ¹⁷	44 ²¹	-16 ¹³	68 ²⁸	9 ³	88 ⁸	19 ²⁰
5	Traverse City ‡-----	93	-12	110	45 ²⁹	0 ³	56 ²⁷	-12 ¹⁶	53 ³⁰	-1 ¹²	87 ¹⁵	1 ¹	98 ⁸	19 ³⁰
6	Alpena §-----	93	-11	104	36 ¹²	-6 ^{5,6}	41 ²²	-11 ¹⁷	52 ³⁰	0 ¹³	78 ¹³	3 ³	90 ⁸	35 ²⁰
7	Harrisville‡-----	96	-13	109	36 ²⁷	-10 ^{3,4,5}	44 ²³	-13 ¹⁹	52 ³⁰	-3 ¹²	83 ¹²	2 ⁴	92 ^{9,10}	34 ¹⁹
8	Grand Haven §-----	87	-6	93	42 ³¹	1 ⁵	47 ²⁷	-6 ¹⁷	63 ³¹	5 ¹²	78 ¹⁴	2 ¹	85 ¹³	42 ³¹
9	Port Huron §-----	91	-9	100	40 ²⁹	-5 ⁵	51 ²⁷	-9 ¹⁷	61 ²⁹	2 ¹³	84 ¹⁹	3 ³	90 ⁴³	20 ³¹
10	Thornville ‡-----	92	-8	100	44 ²⁹	-4 ⁵	53 ²⁷	-8 ¹⁷	58 ²⁹	2 ¹²	87 ²⁰	2 ²	90 ¹¹	40 ²⁰
11	Alma ‡-----												98 ¹⁰	42 ²⁰
12	Agr'l College‡-----	94	-22	116	41 ³¹	-17 ⁴	54 ²⁷	-22 ¹⁶	63 ³¹	-2 ¹²	86 ¹⁷	2 ²	90 ^{30,31}	38 ³⁰
13	{ Lansing, S. B. of } { H. ‡----- }	93	-13	106	45 ²⁹	-8 ⁵	56 ²⁷	-13 ¹⁶	61 ³¹	11 ¹²	85 ¹⁶	2 ²	87 ⁹	39 ³⁰
14	Adrian ‡-----	92	-10	102	43 ²⁹	-9 ⁴	59 ²⁷	-10 ¹⁶	59 ³¹	0 ¹²	86 ²⁰	2 ²	88 ¹⁰	41 ¹⁹
15	Ann Arbor ‡-----	93	-7	100	44 ²⁹	-5 ⁵	56 ²⁷	-5 ¹⁷	60 ²⁹	2 ¹²	86 ¹⁷	3 ³	86 ⁹	44 ²⁰
16	Battle Creek ‡-----	96	-8	104	44 ³⁰	-4 ⁵	58 ²⁸	-8 ¹⁷	64 ³¹	12 ¹³	85 ¹⁶	2 ²	87 ⁸	29 ³⁰
17	Tecumseh ‡-----	92	-8	100	42 ²⁹	-7 ⁴	57 ²⁷	-8 ¹⁷	60 ²⁹	1 ¹²	84 ¹⁷	2 ²	86 ¹⁰	43 ¹⁹
18	Birmingham‡-----	93	-7	100	42 ²⁹	-5 ⁴	59 ²⁷	-7 ¹⁶	69 ²⁹	11 ^{12,13}	86 ²⁰	2 ²	92 ^{8,9}	43 ¹⁹
19	Detroit §-----	95	-6	101	42 ²⁹	-6 ⁴	58 ²⁷	-3 ¹⁷	63 ²⁹	4 ¹²	85 ¹⁸	3 ³	90 ⁹	43 ²⁰

NOTE.—The small figures above and at the right of numbers denoting the degrees of temperature, state the day or days of the month on which the highest or lowest temperature occurred.

* The names of observers, etc., are stated in Exhibit 1.

† The line No. 1, and the three columns for the year 1896, relate only to the 16 stations from which observations were received for every month of the year. It does not include Alma.

‡ For stations marked thus ‡, the daily readings of registering thermometers were recorded at 7 A. M. for the preceding calendar day.

§ At the stations of the U. S. Weather Bureau and at Kalamazoo, the maximum thermometer was read and recorded at 8:00 A. M., and the minimum at 8:00 P. M., 75th meridian time. The local time at these stations corresponding to 8:00 A. M. and 8:00 P. M., 75th Meridian time, is as follows: at Port Huron, 7:30 A. M. and 7:30 P. M.; at Detroit, 7:28 A. M. and 7:28 P. M.; at Alpena, 7:26 A. M. and 7:26 P. M.; at Grand Haven, 7:15 A. M. and 7:15 P. M.; at Marquette, 7:11 A. M. and 7:11 P. M.; at Sault Ste. Marie, 7:23 A. M. and 7:23 P. M.

|| At Ann Arbor the registering thermometers were read and recorded at 9 P. M. till May 9; afterwards at 7 A. M.

¶ Beginning with the year 1885 allowance must be made for Lansing in Table II, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit B, on page 22, Report for 1886.

†† At Ann Arbor for Jan. 2-14 and from Jan. 26-31, the maximum temperature readings were taken from open air thermometer.

the Lowest Temperature occurred by Months of the year 1896; also, Extremes and Readings of Registering Thermometers, or by Observations made daily at 7 A. M. Weather Bureau.

June.		July.		August.		September.		October.		November.		December.		Line number.
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	
91	37	95	39	96	35	88	22	77	15	67	-3	59	-16	1
88 ⁶	41 ^{8,9}	1 ¹¹	16 ¹⁸	95 ⁴	19 ²⁹	84 ⁸	32 ²¹	75 ²	15 ²¹	48 ³	-3 ²⁹	52 ¹¹	-14 ¹	2
89 ³⁰	40 ⁸	92 ¹	48 ¹⁷	92 ³	43 ¹⁹	79 ¹⁹	35 ²²	69 ⁴	26 ¹⁸	54 ²⁶	-12 ³⁰	52 ¹¹	-6 ¹	3
86 ¹⁸	37 ²	87 ^{21,11}	46 ¹⁷	89 ⁴	41 ¹⁹	72 ⁸	29 ²³	65 ⁴	24 ^{18,24}	54 ¹⁶	7 ³⁰	43 ¹¹	-5 ²³	4
89 ^{5,24}	38 ¹	94 ^{1,2}	45 ¹⁶	95 ⁵	40 ³¹	83 ⁹	31 ²²	72 ²³	22 ¹⁷	65 ¹⁷	7 ³⁰	48 ^{11,12}	8 ¹	5
21 ³⁰	86 ³¹	41 ²	46 ¹⁷	93 ⁵	40 ²⁸	75 ¹⁰	28 ²³	65 ³⁰	25 ¹⁷	64 ¹⁶	8 ³⁰	47 ¹¹	4 ²³	6
88 ³⁰	38 ²	93 ¹²	46 ¹⁵	96 ⁵	40 ²⁷	87 ¹⁰	27 ²²	66 ¹⁵	21 ¹⁷	64 ¹⁶	2 ³⁰	48 ^{11,12}	3 ¹	7
85 ⁶	42 ¹	84 ²	47 ¹⁶	87 ^{8,9}	44 ²⁸	84 ¹⁰	32 ²³	75 ²⁹	27 ²²	65 ²⁶	14 ^{29,30}	51 ¹²	9 ²³	8
88 ⁶	40 ²	91 ¹³	50 ¹⁷	90 ⁶	47 ²⁸	86 ¹¹	32 ²³	73 ¹⁵	25 ¹⁹	66 ¹⁶	15 ³⁰	53 ¹²	4 ⁹	9
5 ¹	41 ¹	92 ^{1,3}	45 ¹⁷	92 ^{5,9}	45 ²⁸	86 ¹⁰	30 ²³	74 ^{18,19,25}	26 ¹⁸	66 ¹⁶	12 ³⁰	56 ¹²	1 ²⁴	10
94 ⁶	43 ¹	95 ²	45 ¹⁷	94 ⁵	41 ²⁸	84 ¹⁰	30 ²³	73 ²⁹	21 ¹⁸	64 ^{16,26}	13 ³⁰	53 ^{12,27}	-5 ¹¹	11
93 ⁶	40 ¹⁵	94 ^{2,3}	39 ¹⁶	94 ⁸	35 ³¹	86 ¹⁰	22 ²²	73 ²⁹	15 ¹⁷	67 ¹⁶	8 ³⁰	58 ¹²	-16 ¹²	12
89 ⁶	43 ¹	90 ¹³	43 ¹⁶	93 ⁸	39 ³¹	85 ¹⁰	28 ²²	74 ²⁹	21 ¹⁷	67 ¹⁶	7 ³⁰	59 ¹²	-7 ¹³	13
6 ²⁵	89 ⁴³	92 ¹³	47 ¹⁶	92 ⁹	44 ³¹	88 ¹⁰	30 ²²	74 ²⁹	21 ²⁵	66 ^{16,18}	12 ³⁰	56 ¹²	-8 ¹⁴	14
25	88 ⁴⁵	90 ¹⁴	49 ¹⁷	93 ⁸	46 ¹⁸	83 ¹⁰	32 ²²	75 ²⁹	23 ²⁴	67 ¹⁶	10 ³⁰	53 ¹²	-7 ²⁴	15
6 ²⁵	88 ⁵⁵	95 ²	53 ²³	96 ⁸	49 ¹⁹	85 ¹⁰	36 ²³	77 ²⁹	30 ^{24,25}	67 ¹⁶	15 ³⁰	60 ¹²	7 ²⁴	16
88 ⁶	44 ¹	89 ¹³	48 ¹⁶	92 ⁹	45 ³¹	84 ¹⁰	29 ²²	73 ²⁹	23 ²⁴	65 ^{16,17,18,26}	14 ³⁰	54 ¹²	-8 ²³	17
20	90 ⁴⁴	92 ^{3,29}	47 ¹⁶	93 ⁷	45 ^{26,31}	86 ¹⁰	30 ²²	71 ¹⁵	24 ²⁴	66 ²⁶	10 ³⁰	54 ¹²	0 ^{23,24}	18
6	86 ⁴⁵	91 ¹³	52 ¹⁷	95 ⁹	49 ¹⁹	84 ^{10,11}	33 ²³	74 ¹⁵	30 ¹⁹	65 ^{26,27}	13 ³⁰	56 ¹²	2 ²⁴	19

The average daily range of temperature at from 6 to 19 stations per year, by months, for a period of 17 years, 1879-1895, and a comparison of 1896, with the monthly averages for that period and for 1895, are given in Exhibit 13. The highest and lowest temperatures in every month in 1896, at each of 16 stations are stated in Table II. The average daily range of temperature by months in 1896, at each of 18 stations, and the average for 16 of the stations, are stated in Table III. The lines for 9 of these stations, and the average line for 16 of the stations, are represented in Diagram II. It will be noticed that the greatest average daily range occurred during the months of May and June.

TABLE III.—Average Daily Range of Temperature, by Registering Thermometers during the Year and during each Month of the Year 1896, at each of 16 Stations in Michigan, and Average for 16 Stations.

Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics.)	Divi- sions of the State.†	Norm ‡	Average Daily Range of Temperature—Degrees Fahr.												
			Year 1896.	Months, 1896.											
				Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 16 Stations§	-----	-----	17.48	11.49	15.56	16.48	19.39	21.82	21.27	19.50	19.93	18.22	18.28	14.64	13.12
Rockland -----	U. P.	-----	20.72	13.13	^d 19.59	^b 21.24	^c 22.28	^a 23.80	^b 24.66	^g 24.61	^f 24.62	^c 21.79	^e 21.16	14.81	16.90
Marquette -----	U. P.	15.18 ¹¹	15.35	10.30	15.90	14.80	16.27	20.42	19.40	17.03	17.03	15.27	13.61	12.53	11.65
Sault Ste. Marie ..	U. P.	16.88 ⁵	17.13	11.77	17.10	19.80	16.80	20.20	24.70	21.30	18.90	14.80	14.90	11.60	13.65
Traverse City	N. W.	19.73 ¹⁵	19.93	13.19	18.38	18.61	24.37	26.29	23.63	21.77	23.26	18.80	21.33	16.06	13.42
Alpena -----	N. E.	15.64 ¹⁷	14.77	8.94	13.40	15.00	16.10	17.60	18.80	17.70	17.80	14.90	14.00	12.50	10.52
Harrisville -----	N. E.	20.05 ¹²	18.90	15.62	19.34	19.07	18.77	21.29	20.47	19.51	22.55	18.46	18.29	17.73	15.75
Grand Haven -----	W.	14.97 ⁷	15.65	9.71	13.40	13.77	18.57	19.80	18.10	16.50	16.70	19.80	17.40	13.60	10.50
Port Huron -----	B. & E.	15.81 ¹⁷	14.78	9.00	10.90	11.80	17.47	21.10	18.10	18.00	16.60	16.00	15.40	12.90	10.10
Thornville -----	B. & E.	22.43 ¹⁷	15.23	8.13	11.07	12.36	17.10	21.00	19.63	18.74	18.10	17.03	17.58	12.57	9.48
Agr'l College -----	C.	21.00 ¹⁵	21.94	14.80	18.55	18.71	22.73	26.30	27.96	24.42	27.39	24.50	26.62	16.70	14.65
Alma -----	C.	-----	||	-----	-----	-----	-----	-----	22.14	20.88	21.68	19.29	19.07	14.68	13.10
Lansing, S. B. of H.	C.	19.45 ¹⁸	18.70	12.61	16.34	17.23	20.67	22.61	21.80	20.00	21.51	20.30	21.16	15.77	14.39
Adrian -----	S. C.	19.68 ³	18.19	11.81	15.65	16.39	21.40	22.52	21.40	20.19	20.16	19.27	19.09	15.14	15.26
Ann Arbor -----	S. C.	18.02 ¹⁵	17.44	11.10	13.90	18.79	19.95	20.80 ^g	20.55 ^e	18.00 ^c	18.90 ^b	17.69	19.00	16.40	14.20
Battle Creek -----	S. C.	-----	¶	10.52	-----	16.20	18.97	19.32	15.30	16.62	15.77	13.53	15.97	12.10	9.55
Tecumseh -----	S. C.	19.33 ⁵	17.44	12.16	15.34	15.26	19.43	21.35	20.20	18.04	18.73	18.44	19.67	15.27	15.38
Birmingham -----	S. E.	21.07 ¹⁰	18.56	12.87	17.52	16.81	20.07	24.49	23.47	19.78	20.49	18.73	18.58	16.20	13.71
Detroit -----	S. E.	15.58 ¹⁸	14.87	8.74	12.56	14.10	18.20	19.49	17.50	16.45	16.20	15.73	14.71	14.43	10.29

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I.

† For counties in each division see Exhibit I., in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the annual average range of temperature for periods of years ending in each case with December 31, 1896. The small figures above and at the right of numbers which state the range of temperature, denote the number of years included in the average.

§ This line is an average for all stations for which statements nearly complete are given for every month of the year. It does not include the lines for Alma and Battle Creek.

|| The average for 7 months is 18.69. ¶ For 11 months, 14.90.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 24 days. g For 23 days.

NOTE.—Graphic representations of statements in Table III., are given in Diagram II.

DIAGRAM II.—AV. DAILY RANGE OF TEMPERATURE, BY MONTHS, 1896.

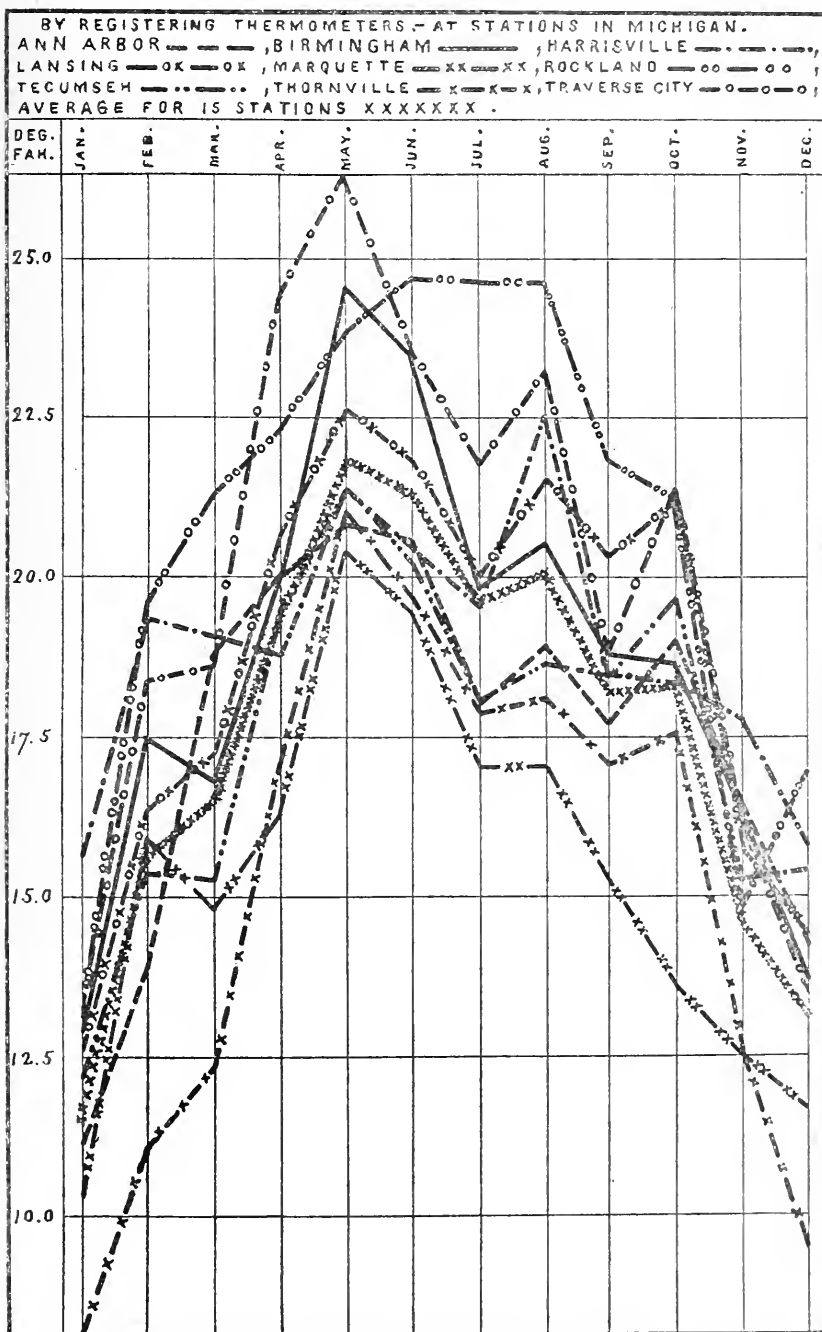


EXHIBIT 14.—*Comparisons of the Average Daily Range of Temperature for the Year and for each Month of the Year 1896, with Averages for the 22 years, 1874-95 and for the Year 1895. Observations made with Registering Thermometers by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Average Daily Range of Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 22 years, 1874-95*	30.27	12.56	18.84	19.08	22.31	23.38	23.39	25.64	26.21	25.00	21.16	16.54	15.42
1895.....	26.93	19.80	20.40	22.30	28.00	27.20	35.50	35.50	33.00	31.80	26.30	23.20	20.16
1896.....	21.94	14.80	18.55	18.71	22.73	26.30	27.96	24.42	27.39	24.50	26.62	16.70	14.65
In 1896 Greater than Av. for 22 years, 1874-95.....		2.24			.42	2.92	4.57		1.18		5.46	.16	
In 1896 Less than Av. for 22 years, 1874-95.....	8.33		.29	.37				1.22		.50			.77
In 1896 Greater than in 1895.....											.32		
In 1896 Less than in 1895.....	4.99	5.00	1.85	3.59	5.27	.90	7.54	11.08	5.61	7.30		6.50	5.51

* For the years 1874-6, 1878, 1879 (except Nov. and Dec.), and 1880, the computations were made from the report of observations published in the Reports of the State Board of Agriculture for those years. For 1877, 1881 (except Jan.), 1882-96, the computations were made from registers or copies of registers supplied by Dr. Kedzie.

The average annual and monthly temperature at from 10 to 22 stations for a period of 19 years, 1877-95, is stated in Exhibit 9, in which is also given, by months, a comparison of 1896 with the average for 1895 and with the averages for the 19 years, 1877-95. By Exhibit 9, which gives averages for groups of several stations in Michigan, it appears that in 1896, the mean temperature in June, August and September was lower than in those months in 1895. It also appears that January, February, April, May, June, July, August, November and December were warmer than the average temperature of the corresponding months for the 19 years, 1877-95.

By Exhibit 16, it appears that, at the Agricultural College, the lowest temperature reached in July, 1896, was below the average lowest temperature for the corresponding month in the preceding 23 years, and that in the month of May, 1896, the range of temperature was less than the average range of temperature for the corresponding month in the 23 preceding years, and also the highest temperature for 1896 was lower than the average highest temperature for the preceding 23 years, and the lowest temperature was below the average lowest temperature for those years. The highest and lowest temperatures at the Agricultural College, in every month in the 7 years, 1890-96, and comparison of months in 1896 with the average highest and lowest temperatures by months for the preceding 23 years, are stated in Exhibit 16.

EXHIBIT 15.—*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each month of the Year 1896, with the Average of the Extremes, and of the Range, for the 19 Years, 1877-95, also, Statement of the Extremes and of the Range for each of the Seven Years, 1890-96. Observations made with Registering Thermometers by Observers for the State Board of Health, and for the U. S. Weather Bureau. These Comparisons, etc., are for Groups of Several Stations in Michigan.*

Year and Months.	Extremes and Ranges of Temperature—Degrees Fahrenheit.																										
	1890.			1891.			1892.			1893.			1894.			1895.			Av. for 19 years, 1877-95.			1896.*			1896 Higher (+), or Lower (-), than Av. 19 years, 1877-95.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year	100	-26	126	100	-14	114	102	-24	126	97	-26	123	102	-26	128	100	-28	128	100	-26	126	98	-25	123	-2	+1	-3
Av. month	79	10	68	78	14	64	77	12	65	77	11	66	81	10	71	80	9	71	79	11	68	78	9	69	-1	-2	+1
January ..	66	-14	80	52	-10	62	57	-22	79	49	-26	75	57	-18	75	50	-12	62	54	-20	74	45	-25	70	-9	-5	-4
February .	63	-8	71	55	-14	69	52	-24	76	44	-23	67	54	-26	80	54	-28	82	55	-21	76	59	-22	81	+4	-1	+5
March	59	-26	85	58	-8	66	64	-13	77	66	-6	72	79	-2	81	69	-16	85	66	-17	79	69	-16	85	+3	-3	+6
April	80	1	79	87	10	77	79	13	66	80	9	71	88	12	76	82	17	65	83	9	74	87	7	80	+4	-2	+6
May	91	21	70	85	25	60	85	27	58	88	27	61	94	30	64	98	26	72	90	23	66	98	33	65	+8	+10	-1
June	98	32	66	97	31	66	102	34	68	96	36	60	98	33	65	99	37	62	96	33	62	91	37	54	-5	+4	-8
July	98	39	59	95	37	58	97	41	56	96	43	53	102	37	65	100	38	62	98	40	58	95	39	56	-3	-1	-2
August....	100	34	66	100	37	63	95	37	58	97	38	59	99	32	67	97	36	61	97	36	60	96	35	61	-1	-1	+1
Sept'ber .	90	27	63	93	35	58	92	30	62	89	22	67	99	29	70	98	28	70	94	29	65	88	22	66	-6	-7	+1
October....	80	24	56	87	21	66	82	23	59	84	22	62	80	20	60	80	10	70	83	19	64	77	15	62	-6	-4	-2
November	68	0	68	65	-3	68	64	5	59	68	6	62	67	-7	74	72	-1	73	69	1	68	67	-3	70	-2	-4	+2
December	50	-6	56	60	8	52	58	-11	69	62	-14	76	60	-19	79	63	-24	87	58	-10	68	59	-16	75	+1	-6	+7

* For the 20 years, 1877-96, the highest temperature was 105°, at Battle Creek, September 9, 1884; the lowest was -36°, at Manistique, January 27, 1885.

Foot-notes to Exhibit 17:

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 17, because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, on page 23, Report for 1886.

† Kalamazoo for 1877-83, 1886-89; Mendon for 1877-82; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Benton Harbor, Coldwater, for 1877-78; Washington for 1880-83; Petoskey for 1879; Winfield for 1881, 1883; Woodmere Cemetery for 1877-79; Hastings, Parkville for 1882; Hillsdale for 1882-84; Manistique for 1884-85; Mackinaw City for 1884-87; Ionia for 1884; Swartz Creek for 1884-85; Pentwater for 1886; Escanaba for 1880-87; Marquette for 1879-84, 1886-87; Gulliver Lake for 1887-90, 1892; Albion for 1890-91; Battle Creek for 1877-79, 1882, 1885, 1892-93; Alma for 1890; Marshall for 1882-92; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Rockland for 1892; Tecumseh for 1878-85, 1894-96; Thornville for 1877-96; Lansing for 1879-96; Agricultural College for 1877, 1881-96; Ann Arbor for 1881-96; Traverse City for 1882-96; Birmingham for 1887-96; Harrisville for 1882, 1885-86, 1895-96.

EXHIBIT 16.—*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each month of the Year 1896, with the Average of the Extremes and of the Range, for the 23 years, 1873-95, also Statements of the Extremes and of the Range for each of the 7 Years, 1890-96. Observations made with Registering Thermometers (except for the first two months of 1873, and for those two months with an ordinary thermometer, at 7 A. M., 2 P. M. and 9 P. M.) Daily by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Year and Months.	Extremes and Range of Temperature—Degrees F.																					1896 Higher (+), or Lower (-), than Av. 23 years, 1873-95.					
	1890.			1891.			1892.			1893.			1894.			1895.			Av. 23 years, 1873-95.						1896.*		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year	97	-4	101	97	-4	101	95	-20	115	95	-16	112	102	-18	120	100	-24	124	95	-18	113	94	-22	116	-1	-4	+3
Av. Month	74	21	53	73	19	54	71	19	52	74	18	56	78	15	63	77	12	65	74	17	56	75	13	62	+1	-4	+6
January ..	63	3	60	51	2	49	50	-20	70	45	-16	61	52	-18	70	40	-10	50	48	-11	59	41	-17	58	-7	-6	-1
February ..	61	12	49	54	-4	58	48	-14	62	43	-10	53	47	-17	64	48	24	72	50	-10	60	54	-22	76	+4	-12	+16
March	52	-4	56	58	2	56	62	9	53	63	5	58	75	9	66	69	-12	81	61	1	60	63	-2	65	+2	-3	+5
April	76	20	56	79	19	60	73	20	53	76	21	55	77	18	59	82	20	62	78	17	61	86	17	69	+5	=	+8
May	83	28	55	80	26	54	80	31	49	83	33	50	85	30	55	95	34	61	85	29	56	90	38	52	+5	+9	-4
June	92	39	53	88	37	51	87	42	45	90	51	39	96	34	62	99	37	62	91	40	51	93	40	53	+2	=	+2
July	92	44	48	86	42	44	95	45	50	92	46	46	102	37	65	100	38	62	93	45	48	94	39	55	+1	-6	+7
August....	97	34	63	97	40	57	90	45	45	95	38	57	99	32	77	97	36	61	94	39	55	94	35	59	=	-4	+4
Septem'ber.	90	29	61	90	38	52	87	39	48	84	22	62	99	29	70	94	28	66	89	31	58	86	22	64	-3	-9	+6
October...	76	25	51	84	21	63	78	24	54	84	22	62	80	20	60	71	10	61	78	21	57	73	15	58	-5	-6	+1
November	62	20	42	58	0	58	58	13	45	65	6	59	65	10	55	72	5	67	63	9	54	67	8	59	+4	-1	+5
December	47	7	40	55	12	43	46	-10	56	62	-8	70	53	-10	63	56	-24	80	53	-4	56	58	-16	74	+5	-12	+18

* For the 23 years, 1873-95, the highest temperature was 101°, August 11, 1874; the lowest was -33°, February 8, 1875, and the range was 134° F.

Foot-notes to Exhibit 19:

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 19, because of a change in the location of instruments. The amount of the variation is shown in Exhibit D, on page 23, Report for 1886.

† Mackinaw City for 1884-87; Kalamazoo for 1878-83, 1886-89; Mendon for 1878-82; Otisville for 1878-80, 1882; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Niles for 1878-79, 1881; Woodmere Cemetery for 1878-79; Washington for 1880-83; Coldwater for 1878; Petoskey for 1879; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Hilldale for 1882-84; Hastings for 1882; Winfield for 1883; Manistique, Swartz Creek for 1884-85; Ionia for 1884; Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1878-87; Gulliver Lake for 1887-90, 1892; Alma for 1890; Marshall for 1882-92; Albion for 1890-91; Rockland for 1892; Battle Creek for 1878-79, 1882, 1885, 1892-93; Tecumseh for 1878-85, 1894-96; Harrisville for 1882, 1885-86, 1894-96; Thornville for 1878-96; Ann Arbor for 1881-96; Lansing for 1879-96; Agr'l College for 1881-96; Traverse City for 1882-96; Birmingham for 1887-96.

EXHIBIT 17.—*Average Absolute Humidity, by year and months in 1896, compared with Annual and monthly Averages for 1895, and for the 19 years, 1877-95.* These Averages are for groups of several stations in Michigan.*

Years, etc.	Absolute Humidity—Grains of Vapor in a Cubic Foot of Air.													
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Av. 19 years, 1877-95†	3.44	1.44	1.53	1.83	2.79	3.94	5.53	6.02	5.73	4.93	3.49	2.31	1.81	
1895 (8 stations)....	3.35	1.19	1.17	1.49	2.90	4.42	5.56	5.39	5.87	5.37	2.76	2.23	1.82	
1896 (8 stations)....	3.65	1.54	1.50	1.56	3.69	5.03	5.64	6.43	6.40	4.66	3.06	2.60	1.75	
In 1896 Greater than Av. for 19 years, 1877-95.....	.21	.10	-----	-----	.90	1.09	.11	.41	.67	-----	-----	.29	-----	
In 1896 Less than Av. for 19 years, 1877-95.....	-----	-----	.03	.27	-----	-----	-----	-----	-----	.27	.43	-----	.06	
In 1896 Greater than in 1895.....	.30	.35	.33	.07	.79	.61	.08	1.04	.53	-----	.30	.37	-----	
In 1896 Less than in 1895.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	.71	-----	-----	.07	

For foot-notes to Exhibit 17 see page 31.

EXHIBIT 18.—*Comparison of the Average Absolute Humidity for the year and for each month of the year 1896, with Averages for the 30 years, 1866-95, and for the year 1895. Observations made at 7 A. M., 2 P. M. and 9 P. M., daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Years, etc.	Absolute Humidity—Grains of Vapor in a Cubic Foot of Air.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 30 years, 1866-95	3.49	1.46	1.55	1.86	2.76	4.04	5.69	6.31	5.94	4.90	3.36	2.24	1.73
1895-----	3.76	1.31	1.26	1.68	3.28	4.61	5.88	5.94	6.84	6.27	3.35	2.58	2.08
1896-----	4.29	1.85	1.87	2.10	4.35	5.93	6.83	7.60	7.45	5.25	3.41	2.85	1.99
In 1896 Greater than Av. for 30 years, 1866-95..... In 1896 Less than Av. for 30 years, 1866-95.....	.80	.39	.32	.24	1.59	1.89	1.14	1.29	1.51	.35	.05	.61	.26
											.06		
In 1896 Greater than in 1895..... In 1896 Less than in 1895.....	.53	.54	.61	.42	1.07	1.32	.95	1.66	.61			.27	
										1.02			.09

EXHIBIT 19.—Average Relative Humidity, by year and months, in 1896,* compared with Annual and Monthly Averages for 1895, and for the 18 years, 1878-95. These averages are for groups of several stations in Michigan.

Years, etc.	Per cent of Saturation—Relative Humidity.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 18 years, 1878-95†	76	83	83	79	71	70	73	71	73	75	76	80	83
1895 (8 stations)----	74	80	78	75	70	70	66	66	72	72	72	79	82
1896 (8 stations)----	77	83	79	76	74	72	72	76	78	80	76	81	82
In 1896 Greater than Av. for 18 years, 1878-95.....	1	0	-----	-----	3	2	-----	5	5	5	0	1	-----
In 1896 Less than Av. for 18 years, 1878-95.....	-----	0	4	3	-----	-----	1	-----	-----	-----	0	-----	1
In 1896 Greater than in 1895.....	3	3	1	1	4	2	6	10	6	8	4	2	0
In 1896 Less than in 1895.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

For foot-notes to Exhibit 19 see page 32.

TABLE IV.—ABSOLUTE HUMIDITY.—*The Average Number of grains of Vapor of Water in a Cubic Foot of Air for Months and Year, 1896, at 11 Stations in Michigan; also Average Line for 8 Stations.—Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M., by observers* for the State Board of Health.*

Stations in Michigan.*	Divisions of the State.†	Grains of Vapor in a Cubic Foot of Air—(Absolute Humidity.)‡													
		Norm. ‡	1896.	Year.											
				Months, 1896.											
Av. for 8 Sta- tions.¶			1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
			3.65	1.54	1.50	1.56	3.69	5.03	5.64	6.43	6.40	4.66	3.06	2.60	1.75
Rockland	U. P.		**				m 3.86	c 4.43	g 4.82	l 5.27	k 5.21	i 3.84	h 2.83		
Traverse City...	N. W.	3.38 ¹⁵	3.54	1.85	1.69	1.80	3.50	4.56	5.27	5.76	6.10	4.42	2.94	2.57	2.07
Harrisville	N. E.	2.94 ²	3.04	0.85	0.84	0.94	2.72	4.20	4.80	5.88	5.95	4.31	2.78	2.01	1.24
Thornville	B. & E.	3.66 ²⁰	3.69	1.78	1.73	1.71	3.81	5.06	5.64	6.26	6.10	4.59	2.91	2.74	2.00
Agr'l College ..	C.	3.57 ¹⁷	4.29	1.85	1.87	2.10	4.35	5.93	6.83	7.60	7.45	5.25	3.41	2.85	1.99
Lansing, S. B. } of H. }	C.	3.37 ¹⁸	3.48	1.46	1.42	1.45	3.66	4.85	5.37	6.07	6.12	4.52	2.90	2.51	1.47
Adrian	S. C.		††					5.29	5.87	6.59	6.62	4.83	3.23		
Ann Arbor	S. C.	3.50 ¹⁶	3.65	1.52	1.47	1.50	3.66	4.90	5.38	6.42	6.33	4.56	3.35	2.84	1.84
Battle Creek....	S. C.		††	0.99			e 3.95	5.09	5.87	6.49	6.46	4.53	3.30	3.07	2.23
Tecumseh	S. C.	3.50 ³	3.65	1.45	1.44	1.49	3.74	5.15	5.68	6.53	6.46	4.69	2.88	2.62	1.61
Birmingham....	S. E.	3.62 ¹⁰	3.89	1.53	1.55	1.51	4.07	5.57	6.11	6.94	6.65	4.94	3.31	2.68	1.81

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit 1.

† The full names of the divisions and the counties in each division are stated in Exhibit 1, in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual Absolute Humidity for periods of years ending in each case with Dec. 31, 1896. The small figures above and at the right of numbers which state the Absolute Humidity, denote the number of years included in the average.

§ The number of grains of vapor in a cubic foot of air at each observation was determined from readings of the psychrometer by means of Glaisher's table, Table XII., of the Smithsonian Meteorological and Physical Tables (1859).

¶ This line is an average for only the stations at which observations were made tri-daily, and from which statements, nearly complete, were received for every month of the year. It does not include the lines for Rockland, Adrian and Battle Creek.

** The average for 7 months is 4.32. †† For 6 months, 5.41. ‡‡ For 10 months, 4.20.

|| Beginning with the year 1896, allowance must be made for Lansing in Table IV., because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, page 23, Report for 1886.

NOTE.—The computations of Absolute Humidity at Ann Arbor for each month in 1896 were furnished by the observer there. All other computations in Table IV. were made at the office of the Secretary of the State Board of Health.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations. b For 91 observations. c For 90 observations. d For 89 observations.
e For 88 observations. f For 87 observations. g For 85 observations. h For 84 observations.
i For 80 observations. j For 78 observations. k For 76 observations. l For 68 observations.
m For 50 observations.

The "average" line, and the lines for seven stations in Table IV. are graphically represented in Diagram III.

DIAGRAM III.- ABSOLUTE HUMIDITY, BY MONTHS, 1896.

GRAINS OF VAPOR IN A CUBIC FOOT OF AIR.- AT STATIONS IN MICHIGAN.
 AGR'L COLLEGE ---, ANN ARBOR ---, BIRMINGHAM ---,
 LANSING ---x, TECUMSEH ---, THORNVILLE ---x, TRAVERSE
 CITY ---o, AVERAGE FOR '8 STATIONS xxxxxx.

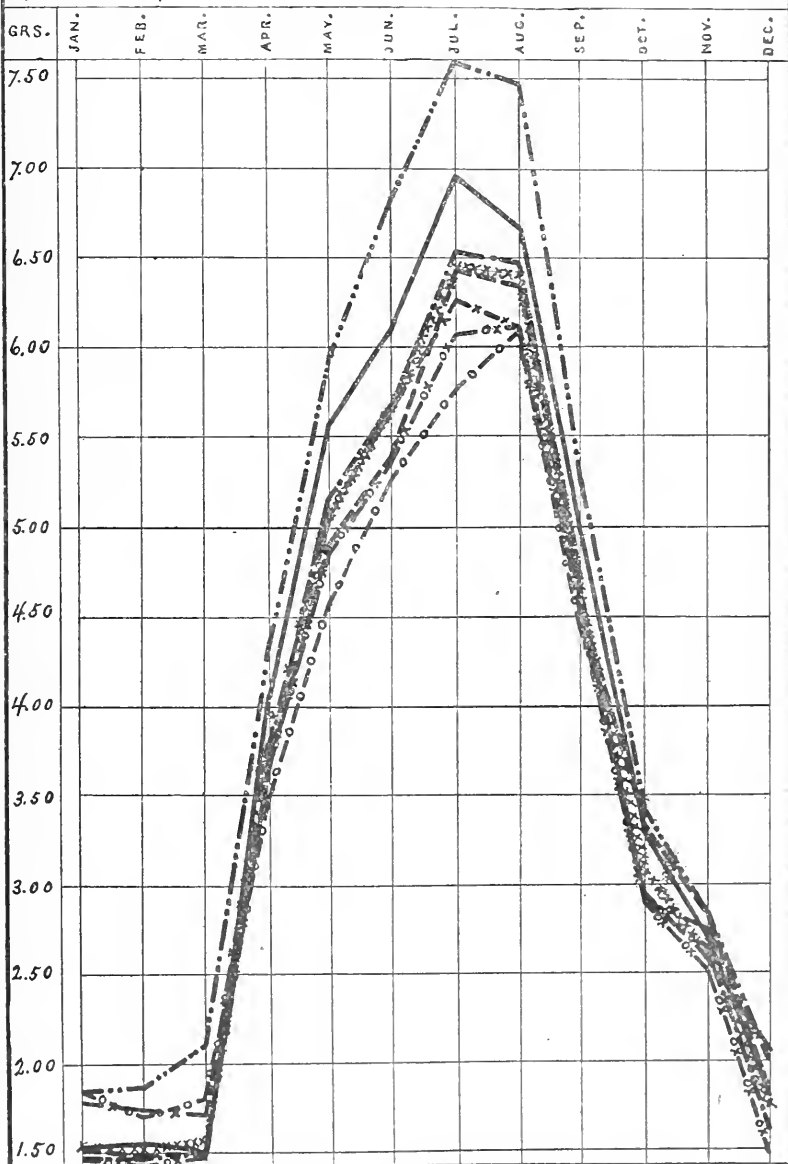


TABLE V.—RELATIVE HUMIDITY.—Average Per cent of Saturation of the Atmosphere with Vapor of Water for Months and Year 1896 at 11 Stations in Michigan; also average line for 8 Stations. Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M., by observers* for the State Board of Health.

Stations in Michigan.*	Divi- sions of the State. †	Per Cent of Saturation.—Relative Humidity.													
		Year.		Months, 1896.											
		Norm. ‡	1896.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 Stations§			77	83	79	76	74	72	72	76	78	80	76	81	82
Rockland.....	U. P.		¶				1	c	h	k	j	i	h		
				a	h		78	74	61	63	65	72	73		
Traverse City....	N. W.	82 ¹⁵	81	96	93	92	76	e	i	d	d	f	a	g	94
								71	72	70	71	78	72	89	
Harrisville.....	N. E.	66 ²	67	53	47	51	71	74	73	78	76	77	71	70	59
Thornville.....	B. & E.	78 ¹⁹	77	92	89	82	73	64	66	69	70	73	70	82	89
Agr'l College.....	C.	79 ³³	90	96	96	95	84	83	83	88	89	92	89	92	91
Lansing, S. B. } of H. ¶¶	C.	72 ¹⁸	72	78	75	68	67	65	65	70	73	75	70	76	79
Adrian.....	S. C.	**						74	73	78	79	80	78		
Ann Arbor.....	S. C.	80 ¹⁶	80	90	84	78	78	71	71	77	79	80	80	81	92
Battle Creek.....	S. C.		||				68	61	62	66	67	68	71	91	90
							e	a							
Tecumseh.....	S. C.	72 ³	75	78	73	68	70	77	72	79	80	80	74	77	74
				a			e	b		a	b	h		d	a
Birmingham.....	S. E.	76 ¹⁰	78	79	78	75	76	73	75	79	82	82	81	80	79

NOTE.—The observations in Table V. were reduced by Guyot's table, in Smithsonian Meteorological Tables, or by a table substantially the same as that. Computations for Ann Arbor in 1896 were made by the observer there. All other Computations in Table V. were made at the office of the State Board of Health.

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

† The full names of the divisions, and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual relative humidity for periods of years ending in each case with December 31, 1896. The small figures above and at the right of the numbers which state the relative humidity, denote the number of years included in the average.

§ This line is an average for only the stations at which observations were made tri-daily and from which statements, nearly complete, were received for every month in the year. It does not include Rockland, Adrian and Battle Creek.

¶ The average for 7 months is 69.

** For 6 months, 77.

|| For 9 months, 72.

¶¶ Beginning with the year 1885, allowance must be made for Lansing in Table V., because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit D, on page 23, Report for 1886.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.

b For 91 observations.

c For 90 observations.

d For 89 observations.

e For 88 observations.

f For 87 observations.

g For 85 observations.

h For 84 observations.

i For 80 observations.

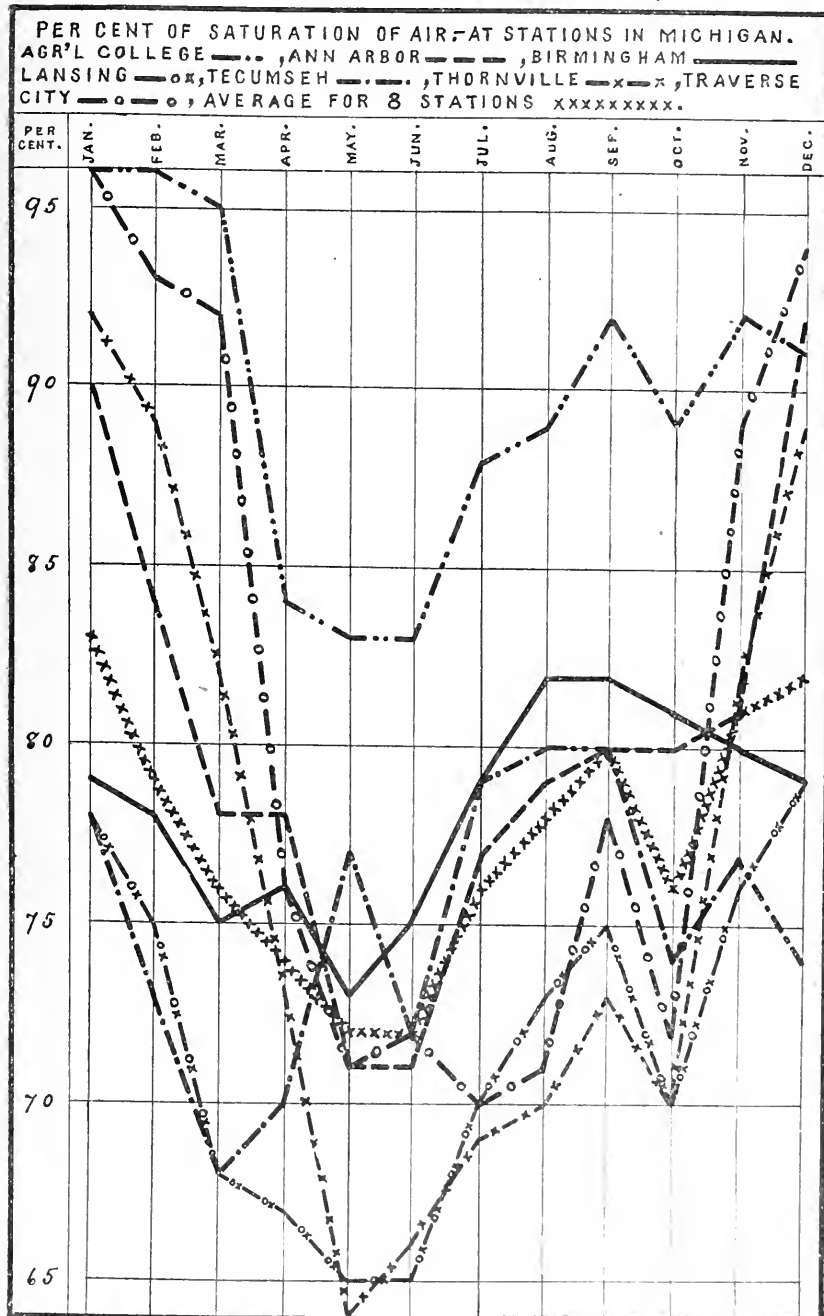
j For 76 observations.

k For 69 observations.

l For 50 observations.

Graphic representations of 7 representative lines in Table V. are given in Diagram IV.

DIAGRAM IV-RELATIVE HUMIDITY, BY MONTHS, 1896.



FOGS.

For the year 1896, fog was reported at 114 morning observations, at 30 afternoon observations (at about 2 P. M.), at 58 evening observations (at about 9 P. M.), and 48 times during the day, no special time being mentioned, in many cases the same fog, or fog at the same time, being reported by different observers. Fog was reported, at one or more stations at some time during the day, on 113 days.

EXHIBIT 21.—*Number of different days on which Fog was observed at one or more of 14 Stations in Michigan* in 1896, and each month of the year 1896.*

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
113	11	8	3	14	8	5	9	8	6	13	8	17

* This Exhibit contains statements only for those localities from which reports were received for every month of the year, as follows: Rockland, Marquette, Sault Ste. Marie, Traverse City, Grand Haven, Port Huron, Battle Creek, Thornville, Agricultural College, Lansing, Ann Arbor, Parkville, Birmingham, and Tecumseh.

Exhibit 21, "Number of different days on which fog was observed," etc., supplies knowledge of the *time*, in each month, on which fog was observed, somewhere in Michigan. Exhibit 22, "Number of observations at which fog was observed," etc., supplies knowledge of the *time* combined with the *area* of the occurrences of fog. For the State as a whole, therefore, the last-mentioned exhibit supplies the most important information. Therefore, in this Report the diagram relative to fog is made to exhibit the facts contained in this last-mentioned exhibit. Heretofore it has represented the "Number of different days on which fog was observed at one or more stations in Michigan."

EXHIBIT 22.—*Number of observations at which Fog was observed in Michigan in 1896, and in each month of the year 1896. (Observations taken 3 times daily,* at 14 Stations.†)*

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
202	33	11	6	17	8	1	11	3	11	20	16	65

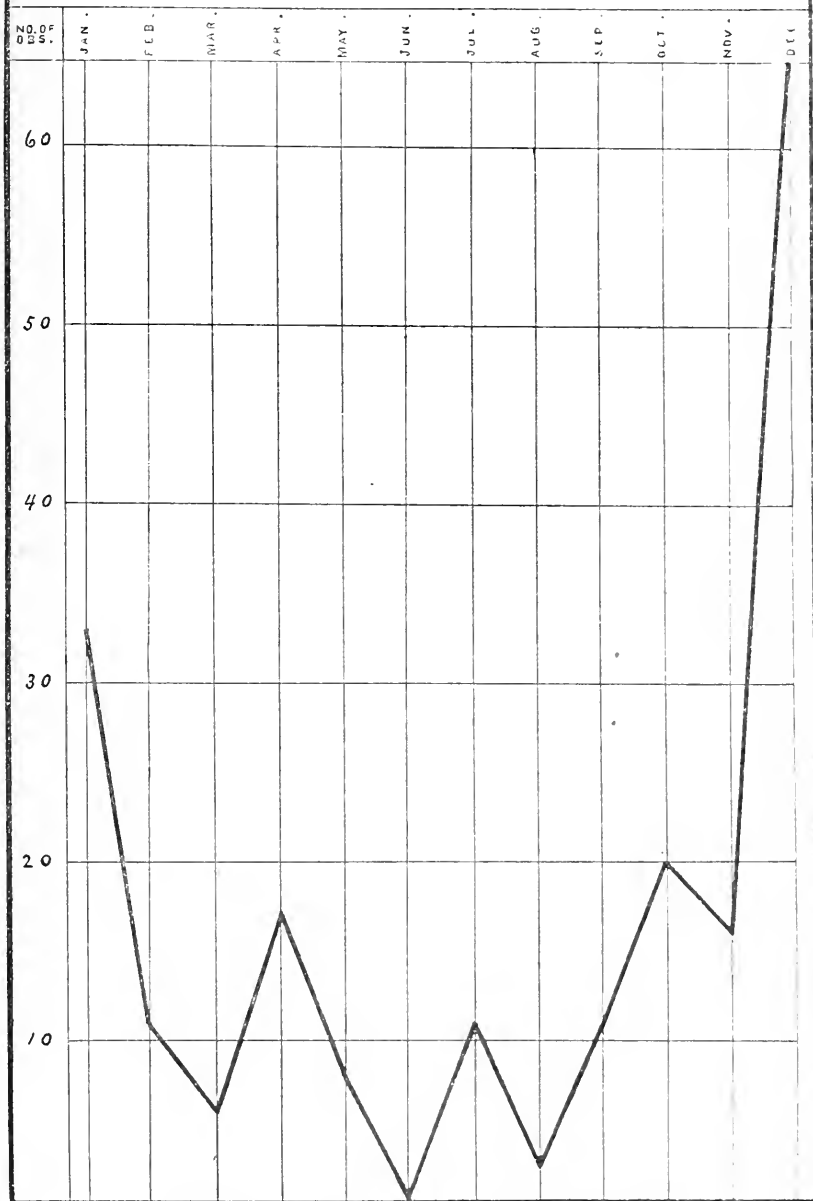
* At the U. S. Weather Bureau Stations the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in Exhibit 23.

† This exhibit contains statements only for those localities from which registers were received for every month of the year; the localities are stated in a foot-note to Exhibit 21 above.

NOTE.—Graphic representations of statements in Exhibit 22 are given in Diagram V.

DIAGRAM V.-CONCERNING FOGS IN MICHIGAN IN 1896.

NUMBER OF OBSERVATIONS OF FOGS, AT ONE OR MORE OF
14 STATIONS IN MICHIGAN, BY MONTHS IN 1896.



[PLATE 599]

EXHIBIT 23.—*Number of different days on which Fog was recorded in 1896, and at 14 stations*

Stations in Michigan.*	No. of days in 1896.	January.			February.			March.			Line number.
		Day of Month.	Hour of Observation.		Day of Month	Hour of Observation.		Day of Month.	Hour of Ob- servation.		
			A. M.	P. M.		A. M.	P. M.		A. M.	P. M.	
Rockland ---- }	12	29	7:00		0			0			1
Marquette -----	9	0			0			0			2
Sault Ste. Marie	4	0			0			0			3
Traverse City --	4	0			0			0			4
Grand Haven {	20	21	{ Early till 10:00 }		1	{ Early till 7:00 }		6	{ Early till noon }		5
		30	{ Early till 10:30 }		5		{ 10:30 till }				6
		31		{ 6:00 till mid- night. }	6	10:00					7
					23	{ Early till 9:30 2:00 to 10:00 }					8
Port Huron -- }	24	29		Night till	1			6	10:30	10:00	9
		30	10:00								10
		30		{ 10:30 till mid- night. }							11
		31	Ended 9:30								12
Thornville ---- }	4	29, 31	Morning		0			0			13
Agr'l College --	1	0			0			0			14
Lansing, S. B. of H. ----- }	64	4, 5, 6		{ Night of 4th till }	1	7:00 till	4:00	6	{ 8:00 till }	9:30	15
		7	10:00 of 7th		5		7:00	30		{ 8:45 till }	16
		7		7:00	16		9:00 till	31	8:00		17
		8		Night till	17	9:00					18
		9	10:00		21		Night till				19
		14		Night till	22	7:00 till	3:00				20
		15	11:00								21
		18		7:00							22
Ann Arbor ----		21	{ 12:30 till 5:00 }								23
		30	5:00 till	9:00 till							24
		31	7:00 till	Night							25
											26
Battle Creek --	13	21, 31	A. M.	P. M.	0			0			27
Parkville ---- }	27	{ 7, 9, 10 18, 21 }	Morning		1, 23			6	Morn.		28
		30, 31		Night							29
Tecumseh -----	15	31		9:00	0			0			30
Birmingham --	6	0			0			0			31

* The names of observers, their place of observation, and the counties in which the places are situated are stated in Exhibit 1.

† Lifted in night.

in each month, the dates and hours of observations† when Fogs were recorded in Michigan.

Line number.	April.			May.			June.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1	12, 16	7:00	-----	2, 16	7:00	-----	0	-----	-----
2	18	-----	9:00	-----	-----	-----	-----	-----	-----
3	{ 9, 11 17, 18 }	-----	-----	17, 18	-----	-----	6, 8, 27	-----	-----
4	0	-----	-----	0	-----	-----	0	-----	-----
5	17	-----	9:00	0	-----	-----	0	-----	-----
6	20	-----	4:30 till	30	Early till 9:00	-----	0	-----	-----
7	21	9:00	-----	-----	-----	-----	-----	-----	-----
8	24	Till noon	-----	-----	-----	-----	-----	-----	-----
9	-----	-----	-----	-----	-----	-----	-----	-----	-----
10	17	-----	Night till	1	Early till 8:30	-----	0	-----	-----
11	18	6:00	-----	12	-----	{ 8:30 till 11:00 }	-----	-----	-----
12	21	{ 12:30 till 7:00 }	-----	-----	-----	-----	-----	-----	-----
13	23	-----	Night till	-----	-----	-----	-----	-----	-----
14	29	6:30	-----	-----	-----	-----	-----	-----	-----
15	30	-----	{ 10:30 and during night }	-----	-----	-----	-----	-----	-----
16	27	-----	Night	0	-----	-----	0	-----	-----
17	28	{ Early till 10:00 }	-----	-----	-----	-----	-----	-----	-----
18	28	7:00	-----	0	-----	-----	0	-----	-----
19	9	-----	*3:00	30	-----	*8:00	24, 25	-----	Night
20	11	-----	*8:45	-----	-----	-----	-----	-----	-----
21	27	-----	8:45 till	-----	-----	-----	-----	-----	-----
22	28	9:00	-----	-----	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----	-----	-----	-----	-----
27	-----	-----	-----	-----	-----	-----	-----	-----	-----
28	-----	-----	-----	-----	-----	-----	-----	-----	-----
29	-----	-----	-----	-----	-----	-----	-----	-----	-----
30	0	-----	-----	0	-----	-----	25	A. M.	-----
31	1	Morning	-----	0	-----	-----	0	-----	-----
32	21	-----	-----	31	-----	-----	25	-----	-----
33	-----	-----	-----	-----	-----	-----	-----	-----	-----
34	28	7:00	-----	1	7:00	-----	0	-----	-----
35	28, 29	7:00	-----	1	7:00	-----	0	-----	-----

* Lifted in night.

† At the U. S. Weather Bureau Stations during 1896, the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in this exhibit.

EXHIBIT 23.—CONTINUED.—*Dates when*

Stations in Michigan.	July.			August.			September.			Line Number.
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.	
Rockland.....	3	7:00	9:00	21	7:00	-----	12	7:00	-----	1
Sault Ste. Marie	4, 13	7:00	-----	19, 24, 27, 28	-----	-----	0	-----	-----	2
	0	-----	-----	0	-----	-----	0	-----	-----	3
Traverse City...	20	7:00	-----	0	-----	-----	0	-----	-----	4
Grand Haven.....	27	Early till 9:30	-----	0	-----	-----	14	Early till noon	-----	5
	-----	-----	-----	-----	-----	-----	-----	-----	-----	6
Port Huron.....	0	-----	-----	0	-----	-----	0	-----	-----	7
	-----	-----	-----	-----	-----	-----	-----	-----	-----	8
	-----	-----	-----	-----	-----	-----	-----	-----	-----	9
Lansing, S. B. of H.	13	-----	Night till	28	-----	*Night	12	-----	2:55 till	10
	14	7:15	-----	-----	-----	-----	13	11:00	Night till	11
	19	-----	Night till	-----	-----	-----	14	8:00	*9:00	12
	20	8:30	Night till	-----	-----	-----	29	-----	9:00 till	13
	21	9:00	-----	-----	-----	-----	30	7:00 till	*Night	14
	-----	-----	-----	-----	-----	-----	-----	-----	-----	15
Ann Arbor.....	21	Morning	-----	8	7:00	-----	13	Morning	*8:00	16
	-----	-----	-----	-----	-----	-----	-----	-----	-----	17
	-----	-----	-----	-----	-----	-----	-----	-----	-----	18
Battle Creek ..	0	-----	-----	0	-----	-----	0	-----	-----	19
	-----	-----	-----	-----	-----	-----	-----	-----	-----	20
	-----	-----	-----	-----	-----	-----	-----	-----	-----	21
Parkville.....	0	-----	-----	7, 24	-----	-----	13, 14, 18	-----	-----	22
	-----	-----	-----	-----	-----	-----	-----	-----	-----	23
Tecumseh	21	7:00	-----	0	-----	-----	0	-----	-----	24
	22	-----	9:00	-----	-----	-----	-----	-----	-----	25
Birmingham....	0	-----	-----	22	7:00	-----	0	-----	-----	26
	-----	-----	-----	-----	-----	-----	-----	-----	-----	27

* Lifted in night.

NOTE.—In Exhibit 23, the word "till," when not followed by a figure, signifies that the fog continued until the succeeding observation.

Fogs were recorded in 1896.

Line Number.	October.			November.			December.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1	0			0			12		9:00
2									
3	0			0			0		
4	29	7:00	2:00	0			29	7:00	
5	26		Night till	25	Early till 9:30		29		7:30 till midnight
6	27	8:00					30	7:00 till	9:00 till
7							31	10:00	
8	3	Early till 8:30		2	Early till 9:00		8	Early till 10:00	
9	26		9:00 till	5	Early till 9:45		17	Early till 9:30	
10	27	9:00		23		6:30 to 8:30	30, 31	A. M.	P. M.
11				25	7:00 till	10:00			
12	1		9:00 till	17	7:00 till	*Night	2		9:00 till
13	2	9:00	Night till	23	10:00 till	*Night	3	8:00	
14	3	8:00	9:00 till	24		Night till	6, 7, 8	Night of 6th to night of 8th	
15	4	8:00		25	7:00 till	5:00	9		Night till
16	7		Night till				10	9:00	
17	8	8:30	*9:00				19	Early till 10:30	
18	9		Night till				21	Early till 9:00	
19	10	8:30					28, 29, 30, 31	Night of night of	28th till 31st
20									
21	3, 4, 10	Morning		0			21, 29		
22	15	A. M.	P. M.						
23	29	A. M.							
24	2, 5	Morning		25	A. M.		7	7:00	
25	27						8, 10	A. M.	
26							29	7:00	P. M.
27							30, 31	A. M.	P. M.
28	3, 5			3			7, 8, 13		
29							29, 30, 31	A. M.	P. M.
30	5	7:00		4		9:00	7, 8, 17	7:00	
31				25	7:00		16, 29		9:00
32							30	7:00	9:00
33							31	7:00	2 and 9
34	29	7:00		0			17	7:00	

* Lifted in night.

NOTE.—Registers were received, but with no fog recorded thereon, from Harrisville, Adrian and Detroit for each month in 1896. A cipher (0) indicates that a monthly register was received from the station with no fog recorded thereon.

TABLE VI.—Average Per Cent of Cloudiness for Months and Year 1896, at 10 Stations in Michigan; also Average Line for 10 Stations. Average of Observations made Daily at 7 A. M., 2 P. M., and 9 P. M., by observers* for the State Board of Health.

Stations in Michigan.*	Divi- sions of the State.†	Average Per Cent of Cloudiness.													
		Year.		Months, 1896.											
		Norm. ‡	1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 10 Sta- tions §			56	79	65	52	52	41	39	48	41	61	50	77	71
Rockland -----	U. P.		55	e 81	i 69	f 48	j 55	d 37	h 28	p 31	o 30	m 52		n 91	e 63
Traverse City ----	N. W.	59 ¹⁵	60	89	73	60	a 60	a 41	d 26	e 43	e 49	d 64	d 49	d 91	a 75
Harrisville -----	N. E.	61 ¹²	67	79	66	58	71	62	42	65	55	78	59	85	83
Thornville -----	B. & E.	51 ²⁰	49	82	60	40	42	24	34	38	33	54	41	67	69
Agr'l College -----	C.	57 ³³	56	76	67	52	46	41	44	53	45	60	42	71	74
Lansing, S. B. } of H. }	C.	57 ¹⁸	60	80	64	56	53	46	51	55	46	64	48	78	75
Ann Arbor -----	S. C.	56 ¹⁷	53	74	59	51	43	34	41	50	41	58	46	73	71
Battle Creek -----	S. C.	49 ⁶	55	74	a 63	55	d 50	a 38	44	b 46	a 42	d 62	a 43	77	71
Tecumseh -----	S. C.	45 ³	49	72	d 56	46	d 44	a 38	35	e 42	j 32	k 56	c 38	e 65	59
Birmingham -----	S. E.	59 ¹⁰	60	82	m 70	b 56	g 57	g 50	g 48	e 56	j 41	k 62	c 53	71	70

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit I.

† The full names of divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average per cent of cloudiness for periods of years ending in each case with Dec. 31, 1896. The small figures above and at the right of numbers which state the per cent of cloudiness, denote the number of years included in the average.

§ This line is an average for all the stations at which tri-daily observations were made, and from which statements, nearly complete, were received for every month of the year.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations. b For 91 observations. c For 90 observations. d For 89 observations.
e For 88 observations. f For 87 observations. g For 86 observations. h For 85 observations.
i For 83 observations. j For 82 observations. k For 81 observations. l For 80 observations.
m For 79 observations. n For 67 observations. o For 65 observations. p For 62 observations.

Graphic representations of 9 representative lines in Table VI., are given in Diagram VI.

DIAGRAM VI.—AV. PER CENT OF CLOUDINESS, BY MONTHS, 1896.

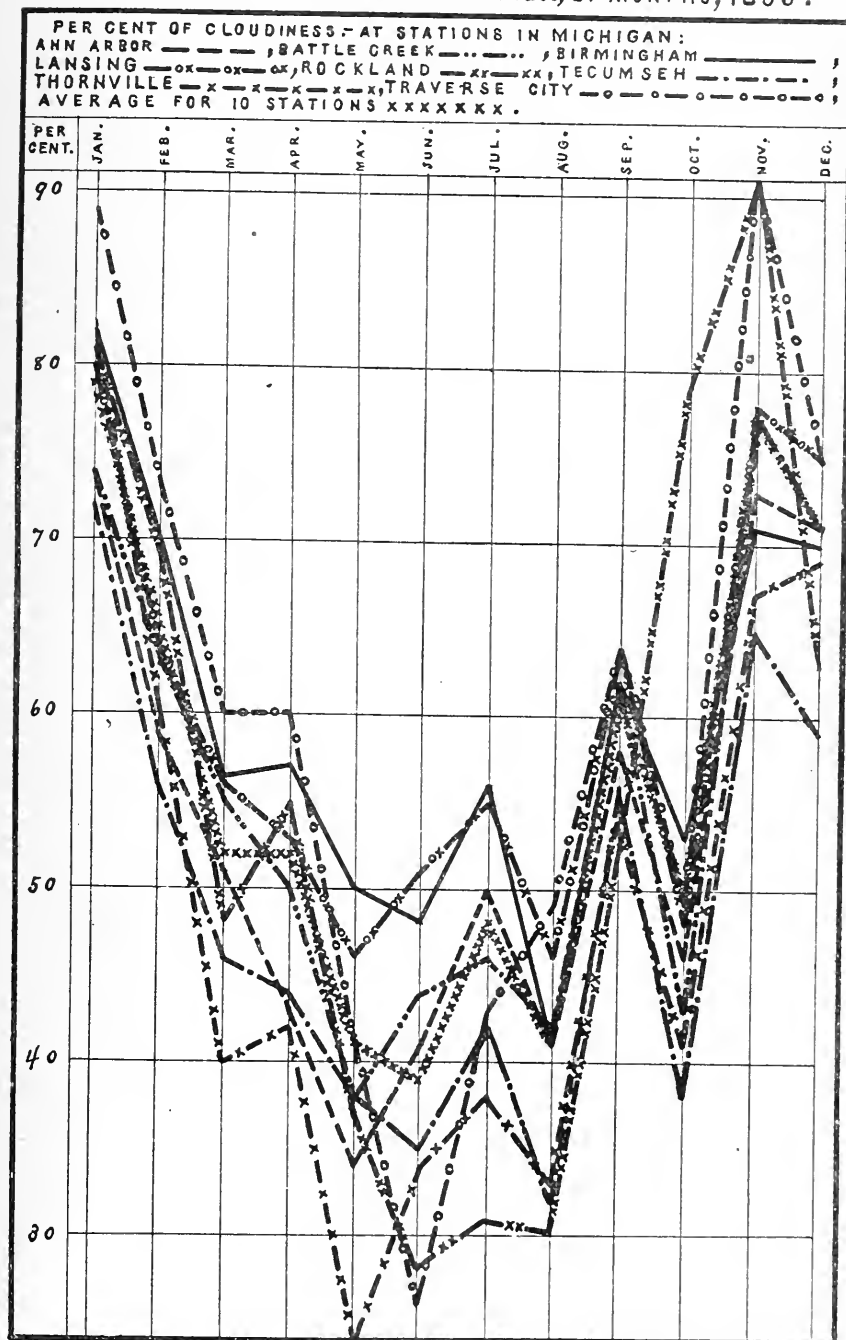


EXHIBIT 27.—*Dates of Solar and Lunar Halos*

Line Number.	Stations.	Dates of Halos Recorded,									
		January.		February.		March.		April.		May.	
		Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.
1	Marquette.....	-----	-----	-----	22	-----	-----	-----	25	-----	-----
2	Sault Ste. Marie.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	23
3	Ann Arbor.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
4	Lansing, S. B. of H....	3, 5, 15, 29	1, 26	19, 22, 27	22, 25, 27	3, 14, 24, 28	27	8*	18, 26	5†	19, 23
5	Parkville.....	4, 5	3	-----	-----	-----	-----	-----	-----	-----	-----
6	Rockland.....	-----	-----	-----	-----	9	-----	-----	-----	-----	-----

* Also, Apr. 10, 11, 14, 18, 23, 28, 30. † Also, May 16, 18, 21, 22, 31.

Parhelia, Jan. 1.—*Thornville.* Jan. 1, 4, 5, 8; Feb. 19; Mar. 9, 21, 24; Apr. 5, 22; Nov. 9, 10, 24; Dec. 3, 14.—*Lansing.*

EXHIBIT 28.—*Inches of Rain and Melted Snow, by Year and Months in 1896, compared with Annual and Monthly Averages for 1895, and for the 19 years, 1877-95. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Inches of Rain and Melted Snow.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 years, 1877-95*	34.66	2.25	2.45	2.19	2.54	3.60	3.71	2.93	3.01	3.08	3.10	3.12	2.71
1895 (16 stations)...	27.06	2.95	0.72	0.97	1.51	3.04	1.34	1.47	3.23	2.53	1.18	3.48	4.65
1896 (16 stations)...	32.65	1.61	1.34	1.29	2.91	3.14	3.13	4.25	3.95	4.92	1.80	3.38	0.92
In 1896 Greater than Av. for 19 years, 1877-95.....	-----	-----	-----	-----	.37	-----	-----	1.32	.94	1.84	-----	.26	-----
In 1896 Less than Av. for 19 years, 1877-95.....	2.01	.64	1.11	.90	-----	.46	.58	-----	-----	-----	1.30	-----	1.79
In 1896 Greater than in 1895.....	5.59	-----	.62	.32	1.40	.10	1.79	2.78	.72	2.39	.62	-----	-----
In 1896 Less than in 1895.....	-----	1.34	-----	-----	-----	-----	-----	-----	-----	-----	-----	.10	3.73

* Benton Harbor for 1877-78; Mendon for 1877-78, 1880-82; Niles for 1878-81; Nirvana for 1877-79, and to and including April 25, 1880; Reed City from April 26 to December 31, inclusive, in 1880, and for 1881-85; Coldwater, Woodmere Cemetery for 1877-79; Otisville for 1878-80, 1882; Escanaba for 1880-87; Washington for 1880-83; Fife Lake, Ypsilanti for 1887; Winfield for 1881-83; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Ionia for 1883-84; Manistique, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Pentwater, East Saginaw for 1886; Gulliver Lake for 1887-90, 1892; Otsego, Alma for 1890; Hudson for 1886, 1888-89; Manistee for 1889-92; Albion for 1890-91; Marshall for 1881-84, 1886-93; Kalamazoo for 1877-90, 1892-94; Rockland for 1891;

Recorded on the Monthly Registers in 1896.

Months, 1896. .														Line Number.
June.		July.		August.		September.		October.		November.		December.		
Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	
											14		15, 16, 19	1
														2
							20							3
1				4, 23, 25	19	18	15, 17	8‡	15	2, 9, 10, 26	15, 19, 22	3**	11, 14, 16, 20	4
														5
														6

† Also Oct. 10, 19, 23, 29. ** Also, Dec. 8, 14, 17, 19, 23, 28.

EXHIBIT 29.—*Comparison of the Rainfall during the Year and during each Month of the Year 1896, with that for the Year 1895, and with the Average for the 32 Years, 1864-95. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Inches of Rain and Melted Snow.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 32 years, 1864-95	30.75	1.76	1.93	2.31	2.38	3.23	3.90	2.99	2.77	2.73	2.46	2.30	1.99
1895.....	22.80	1.04	0.12	0.27	0.67	2.06	1.01	1.47	4.64	0.85	1.41	3.87	5.39
1896.....	35.30	0.79	1.51	1.31	2.77	3.14	2.60	6.73	4.73	6.73	1.06	3.13	0.80
In 1896 Greater than Av. for 32 years, 1864-95.....	4.55	-----	-----	-----	.39	-----	-----	3.74	1.96	4.00	-----	.83	-----
In 1896 Less than Av. for 32 years, 1864-95.....	-----	.97	.42	1.00	-----	.09	1.30	-----	-----	-----	1.40	-----	1.19
In 1896 Greater than in 1895.....	12.50	-----	1.39	1.04	2.10	1.08	1.59	5.26	.09	5.88	-----	-----	-----
In 1896 Less than in 1895.....	-----	.25	-----	-----	-----	-----	-----	-----	-----	-----	.35	.74	4.59

Battle Creek for 1877-78, 1884, 1888; Tecumseh for 1877-78, 1880-85, 1894-96; Thornville, Detroit for 1877-96; Agricultural College for 1877-78, 1881-96; Marquette for 1879-84, 1886-96; Alpena, Port Huron for 1879-96; Grand Haven for 1879-88, 1890-96; Lansing for 1880-96; Harrisville for 1881-82, 1887-96; Ann Arbor for 1881-82, 1885-86, 1888-96; Traverse City for 1882-96; Parkville for 1882-83, 1885-96; Birmingham for 1887-96; Rockland for 1891, 1896; Sault Ste. Marie for 1892-96.

TABLE VII.—*Inches of Rain and Melted Snow for Months and Year 1896, at 16 Stations in Michigan; Also Average Line for 16 Stations,—as compiled from daily observations made by observers* for the State Board of Health, and for the U. S. Weather Bureau.*

Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics)	Divi- sions of the State.†	Inches of Rain and Melted Snow.													
		Year.		Months, 1896.											
		Norm. ‡	1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 16 stations§			32.65	1.61	1.34	1.29	2.91	3.14	3.13	4.25	3.95	4.92	1.80	3.38	0.92
Rockland.....	U. P.		28.87	2.00	0.90	0.40	5.10	2.63	1.34	1.25	0.75	1.70	5.70	6.30	0.80
Marquette.....	U. P.	31.84 ¹¹	29.59	2.04	1.75	1.20	3.12	2.46	2.25	1.49	1.93	1.34	4.20	6.44	1.37
Sault Ste Marie..	U. P.	34.67 ⁵	34.62	3.97	1.98	1.06	3.13	6.70	1.94	0.96	3.57	2.48	3.04	4.84	0.95
Traverse City....	N. W.	37.26 ¹⁵	34.00	2.24	1.44	2.11	2.20	6.01	1.60	3.22	2.10	6.07	1.10	5.28	0.63
Alpena.....	N. E.	34.99 ²⁴	30.14	1.56	0.91	0.49	2.46	2.94	3.09	0.62	6.78	6.00	0.84	3.44	1.01
Harrisville.....	N. E.	33.15 ¹⁶	33.51	2.47	1.21	0.42	2.27	3.23	5.01	2.56	3.97	6.42	1.47	3.63	0.85
Grand Haven....	W.	35.14 ⁶	30.18	1.73	2.22	1.64	3.47	1.95	1.00	4.12	1.97	5.95	1.05	3.78	1.30
Port Huron.....	B. & E.	31.66 ²²	27.72	0.69	1.37	1.47	1.81	1.86	1.79	4.88	4.74	4.74	1.25	1.81	1.31
Thornville.....	B. & E.	32.74 ²⁰	33.30	1.63	1.23	1.05	3.77	2.63	4.03	4.29	6.21	5.06	1.40	1.36	0.64
Agr'l Coll ge.....	C.	30.89 ³³	35.30	0.79	1.51	1.31	2.77	3.14	2.60	6.73	4.73	6.73	1.06	3.13	0.80
Lansing, S. B. } of H. }	C.	33.06 ¹⁷	32.78	1.11	1.08	1.15	2.05	2.67	3.39	7.10	3.28	6.40	0.85	2.98	0.72
Ann Arbor.....	S. C.	29.70 ⁹	28.96	0.70	1.20	0.92	2.24	2.14	3.99	6.44	2.63	4.93	1.51	1.86	0.40
Parkville.....	S. C.	41.72 ¹⁶	38.60	1.61	1.40	1.88	3.09	2.93	2.70	6.19	7.02	6.84	0.84	3.28	0.82
Tecumseh.....	S. C.	29.69 ³	35.88	1.43	0.55	1.79	3.93	3.79	4.05	6.59	4.46	4.80	1.14	2.14	1.21
Birmingham.....	S. E.	30.16 ¹⁰	32.68	0.65	1.10	1.45	1.61	3.16	4.33	6.20	4.49	4.98	1.64	2.14	0.93
Detroit.....	S. E.	32.70 ²⁵	36.20	1.17	1.60	2.28	3.61	2.05	6.97	5.39	4.60	4.23	1.65	1.72	0.93

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I.

† The names of divisions, and the counties in each, are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the annual average rainfall for periods of years ending in each case with December 31, 1896. The small figures above and at the right of numbers which state the rainfall denote the number of years included in the average.

§ This line is an average for all the stations, from which statements are given for every month of the year.

NOTE.—The computations of amount of rainfall were furnished by the observers at Detroit, Alpena, Grand Haven, Port Huron, Ann Arbor, Sault Ste. Marie and Marquette for the year. All other computations in Table VII., were made in the office of the Secretary of the State Board of Health.

The lines for 8 representative stations in Table VII., are graphically represented in Diagram VII.

DIAGRAM VII.—RAINFALL, BY MONTHS, 1896.

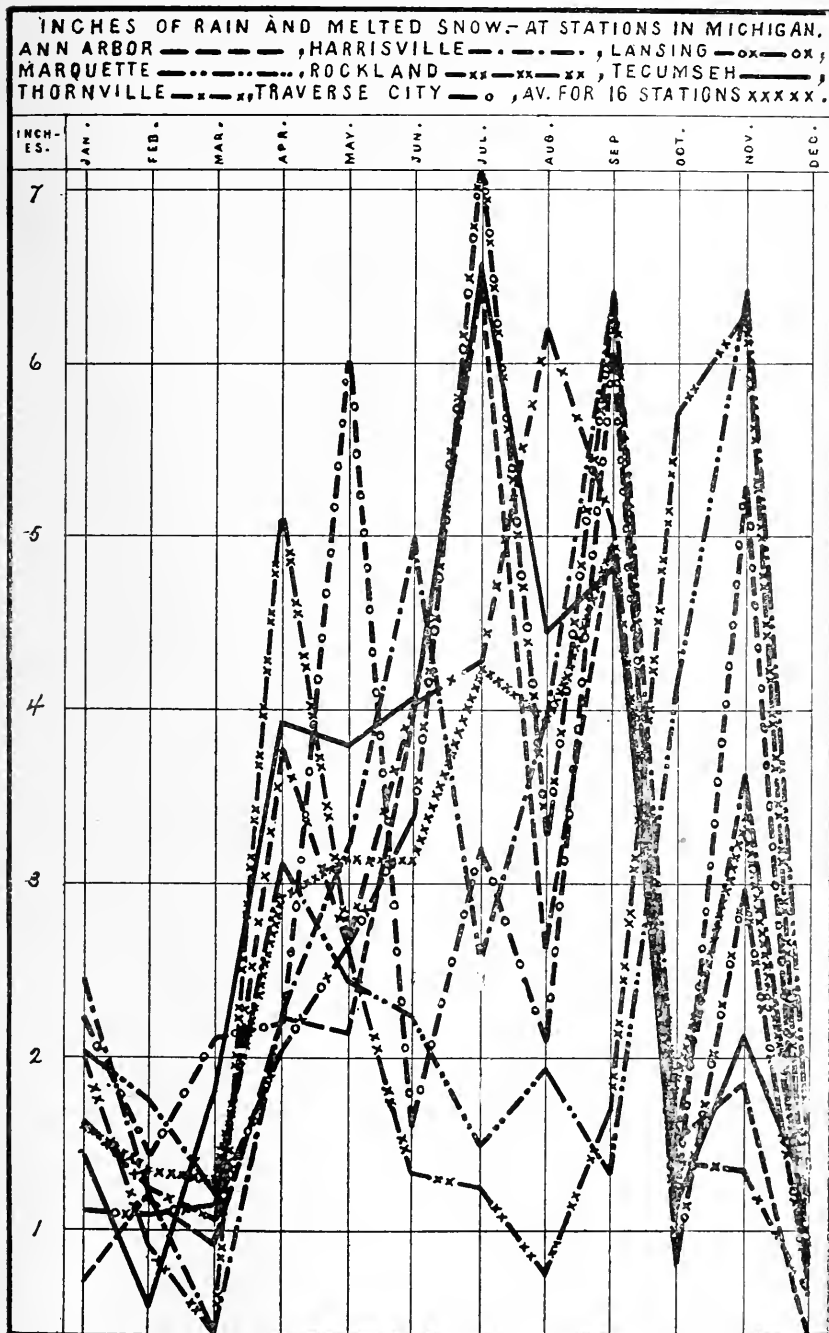


TABLE VIII.—*Relative amount of Ozone in the Atmosphere by Day, for Months and Year 1896, at 13 Stations, also Average line for 9 Stations in Michigan, as indicated by averages of observations made daily by exposing Test-paper prepared according to Schönbein's formula, from 7 A. M. to 2 P. M.—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10) by observers for the State Board of Health, and for the U. S. Weather Bureau.**

Stations in Michigan.† (Those of the U. S. Weather Bureau in Italics.)	Divi- sions of the State. †	Degrees of Coloration of Test-paper.—Day Observation.**													
		Year.		Months, 1896.											
		Norm. ‡	1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 9 Stations§	-----	-----	3.71	3.91	4.12	4.20	4.07	3.83	3.67	3.03	4.00	3.15	3.29	i 3.45	3.78
Rockland -----	U. P.	5.66 ³	5.77	5.99	c 5.54	a 5.77	c 5.51	a 5.87	b 5.57	h 4.92	g 6.35	b 5.38	6.01	f 6.40	5.95
Traverse City.....	N. W.	5.05 ¹⁵	6.56	6.70	6.57	6.57	6.50	6.96	7.00	6.46	7.08	6.04	6.27	6.21	6.39
Alpena -----	N. E.	-----	¶	3.89	3.02	3.61	3.47	3.22	3.27	2.79	4.76	2.41	2.59	2.31	-----
Harrisville.....	N. E.	3.82 ¹²	2.68	3.12	2.78	2.66	2.74	2.73	2.97	2.30	3.27	2.61	2.21	1.95	2.76
Grand Haven.....	W.	-----	4.28	3.38	3.49	3.45	4.87	4.99	4.67	5.11	6.23	4.54	3.76	2.88	3.95
Port Huron.....	B. & E.	-----	0.98	0.51	0.75	0.66	1.50	1.96	1.84	1.21	1.56	0.74	0	0.48	0.60
Thornville.....	B. & E.	3.07 ²⁰	4.20	6.05	5.19	4.70	4.84	2.96	2.37	2.24	4.24	3.34	4.27	4.81	5.40
Lansing, S. B. } of H.	C	3.09 ¹⁸	2.17	2.02	2.06	2.21	2.84	2.86	2.64	2.17	2.95	1.91	1.49	1.21	1.66
Adrian -----	S. C.	2.33 ³	2.52	3.67	4.16	4.47	2.57	1.76	1.90	1.21	2.31	1.31	1.82	1.78	3.24
Ann Arbor.....	S. C.	2.93 ⁴	2.53	1.99	3.26	4.02	3.94	3.47	3.87	2.33	2.82	1.78	1.14	0.61	1.14
Battle Creek.....	S. C.	2.75 ³	2.61	1.35	3.16	2.63	2.90	2.96	2.14	1.72	1.89	1.41	2.59	4.51	4.11
Tecumseh -----	S. C.	4.57 ³	4.33	4.28	4.40	4.76	4.80	4.89	4.54	3.95	5.08	4.54	3.85	3.55	3.34
Birmingham.....	S. E.	-----	††	2.41	2.06	2.18	2.27	2.96	2.80	2.69	-----	2.58	2.14	2.18	2.37

* At the stations of the U. S. Weather Bureau during the year 1896, the observations were made by exposing the test-paper from 8 A. M. to 8 P. M., all 75th Meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table II.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1. The full names of the divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual relative amount of ozone by day for periods of years ending in each case with December 31, 1896. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

§ This line is an average for only the stations from which statements nearly complete were received for every month in the year. It does not include Birmingham and the Weather Bureau Stations.

¶ The average for 11 months is 3.21. †† For 11 months, 2.42.

** Allowance has been made for difference in sensitiveness of test-paper. See "i" below.

a, b, c. In the columns from January to December, inclusive, the a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 21 days. h for 20 days.

i CONCERNING OZONE CORRECTIONS.—It is now believed that the correction (for variation in sensitiveness of different lots of test-paper) applied to the monthly averages in the tables for the day and the night ozone, for the month of November in each of the years 1891, 1892, and 1893, at stations in Michigan and at Lansing, was .39 too great for the day (7 A. M. to 2 P. M.) and .54 for the night ozone (2 P. M. to 9 P. M.). This should be taken into consideration in studying the tables relative to ozone in the Annual Reports of this Board for those years.

Nine lines in this table are represented in Diagram VIII.

DIAGRAM VIII.- OZONE, AV. BY DAY, MONTHS IN 1896.

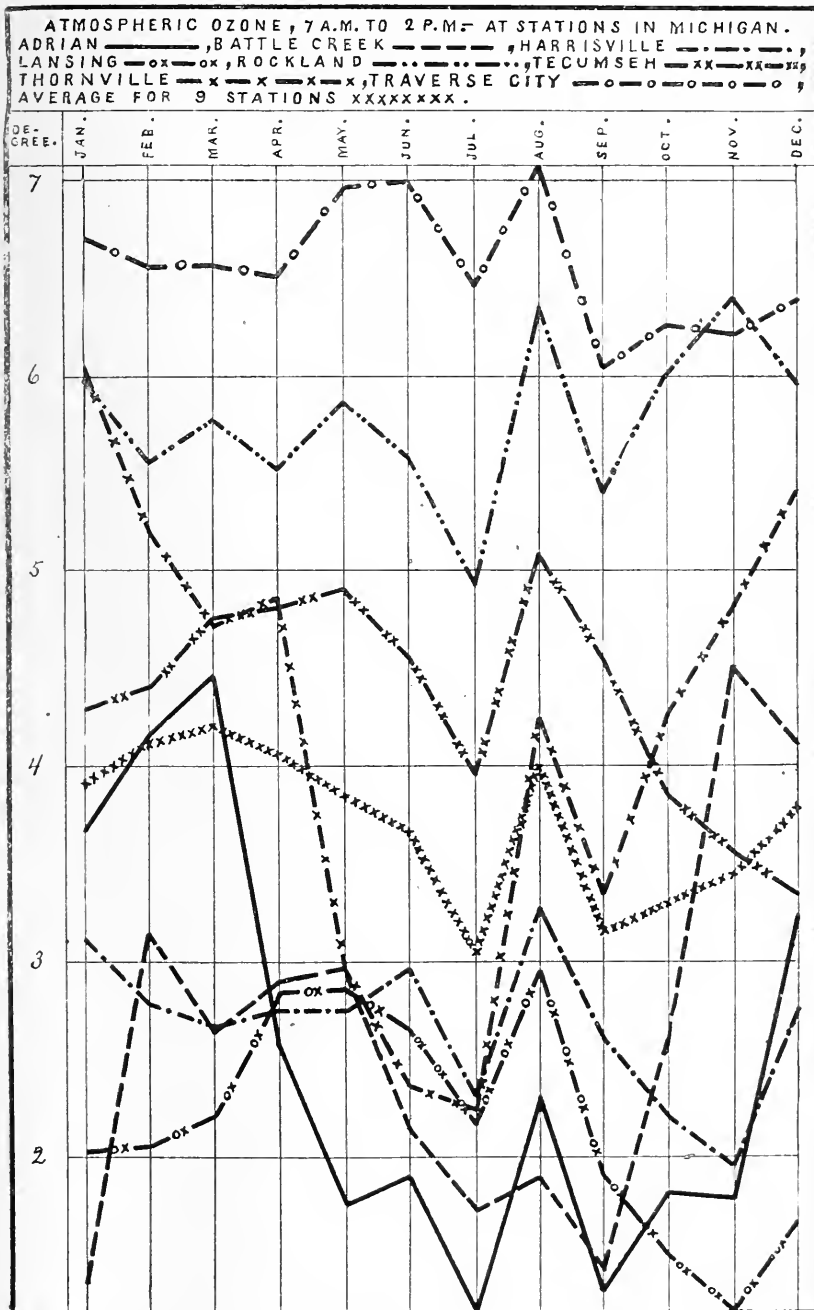


TABLE IX.—*Relative Amount of Ozone in the Atmosphere at Night for Months and Year 1896, at 13 Stations, also Average Line for 9 Stations in Michigan,—as indicated by Averages of Observations made Nightly by exposing Test-paper, prepared according to Schönbein's formula, from 9 P. M. to 7 A. M.,—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10), by observers for the State Board of Health, and for the U. S. Weather Bureau.**

Stations in Michigan † (Those of the U. S. Weather Bureau in Italics.)	Divi- sions of the State. ‡	Degrees of Coloration of Test-paper.—Night Observation **													
		Year.		Months, 1896.											
		Norm. §	1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 9 Stations||	-----	-----	4.16	4.04	4.61	4.64	4.48	4.53	4.40	3.62	4.37	3.54	3.43	3.95	4.29
Rockland	U. P.	6.20 ⁸	6.31	6.41	c 6.28	b 6.15	b 6.51	6.25	a 5.95	f 5.66	e 6.97	b 5.95	5.88	d 6.69	e 6.96
Traverse City....	N. W.	5.03 ¹⁵	6.67	6.66	b 6.97	6.73	6.67	7.09	g 7.10	6.67	7.33	6.41	5.72	6.20	6.54
Alpena.....	N. E.	-----	††	4.34	4.30	3.95	4.47	4.02	3.98	4.13	4.60	3.81	3.33	3.46	-----
Harrisville.....	N. E.	4.31 ¹²	3.00	3.31	3.27	2.83	3.07	2.99	2.71	2.51	3.59	2.94	2.69	2.46	3.60
Grand Haven....	W.	-----	4.79	4.05	4.46	4.96	5.12	5.77	5.06	4.77	6.28	4.84	4.24	3.88	4.02
Port Huron.....	B. & E	-----	0.94	0.05	0.72	0.67	1.44	1.80	1.34	1.35	1.75	0.71	0	0.63	0.86
Thornville.....	B. & E.	3.32 ²⁰	5.57	6.57	6.6c	6.34	5.84	5.12	5.34	4.16	4.49	4.34	5.27	5.96	6.70
Lansing, S. B. } of H. }	C.	3.44 ¹⁸	2.65	2.35	3.03	2.44	3.17	3.99	3.08	2.45	3.78	2.17	1.49	2.03	1.86
Adrian.....	S. C.	2.85 ³	5.00	6.63	4.34	5.05	2.64	2.19	2.58	1.64	2.94	2.01	2.30	2.56	4.05
Ann Arbor.....	S. C.	2.76 ⁴	2.35	2.05	3.47	3.38	3.54	3.73	3.38	2.07	2.46	1.38	0.46	1.33	1.34
Battle Creek.....	S. C.	2.40 ³	2.60	0.86	1.48	2.76	3.09	3.57	3.70	2.45	1.94	1.44	2.49	3.80	3.64
Tecumseh.....	S. C.	5.45 ³	5.23	4.50	5.96	6.05	5.80	5.80	5.74	4.96	5.81	5.24	4.53	4.50	3.89
Birmingham.....	S. E.	-----	††	2.15	2.13	2.18	2.23	3.12	2.91	3.13	-----	2.81	2.43	2.33	2.57

* At the U. S. Weather Bureau Stations during the year 1896, the observations were made by exposing the test-paper from 8 P. M. to 8 A. M., 75th meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table II.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I.

‡ The full names of the divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

§ Numbers in this column state the average annual relative amount of ozone by night for periods of years ending in each case with December 31, 1896. The small figures above and at the right of the numbers which state the average, denote the number of years included in the average.

|| This line is an average for only the stations from which statements, nearly complete, were received for every month in the year. It does not include Birmingham, and the U. S. Weather Bureau Stations.

** Allowance has been made for difference in sensitiveness in test-paper. See "i" foot-note, Table VIII.

†† The average for 11 months is 4.04. ‡‡ For 11 months, 2.54.

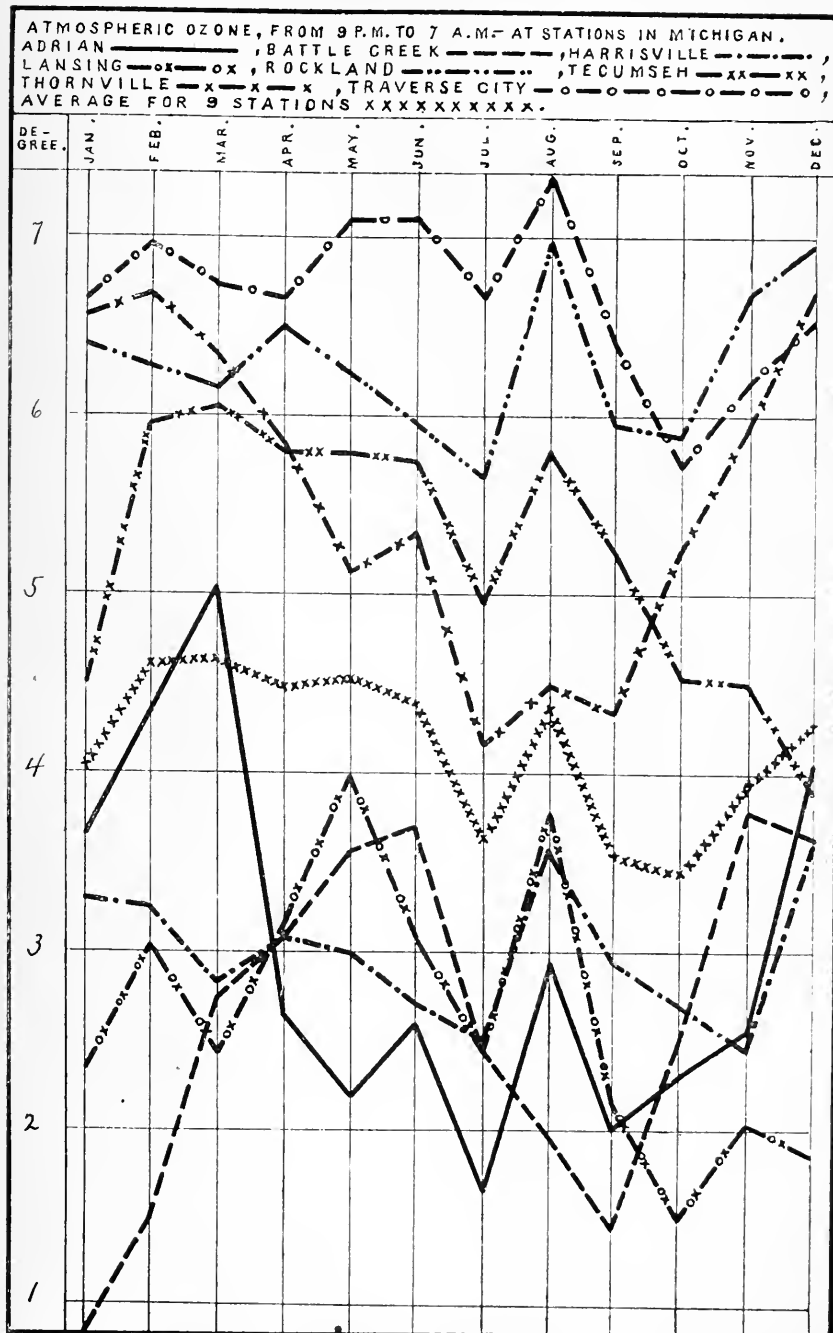
a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 29 days. b For 28 days. c For 27 days. d For 26 days. e For 25 days. f For 22 days.

g For 21 days.

Nine lines in this table are graphically represented in Diagram IX.

. DIAGRAM IX- OZONE, AV. BY NIGHT, MONTHS IN 1896 .



[PLATE 90]

EXHIBIT 30.—Average Amount of Atmospheric Ozone (Day), by Year and Months, in 1896, compared with Annual and Monthly Averages for 1895, and for the 19 Years, 1877-95. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Ozone by Day.—Degrees of Coloration of Test-paper.*												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 years, 1877-95†	3.46	3.66	3.77	3.79	3.60	3.71	3.47	3.03	3.40	3.16	3.17	3.21	3.47
1895 (9 stations)....	3.67	4.18	4.05	4.10	4.07	4.17	3.51	2.91	3.92	3.14	3.04	3.19	3.74
1896 (9 stations)....	3.71	3.91	4.12	4.20	4.07	3.83	3.67	3.03	4.00	3.15	3.29	3.45	3.78
In 1896 Greater than Av. for 19 years, 1877-95.....	.25	.25	.35	.41	.47	.12	.20	0	.60	-----	.12	.24	.31
In 1896 Less than Av. for 19 years, 1877-95.....								0		.01			
In 1896 Greater than in 1895.....	.04	-----	.07	.10	0	-----	.16	.12	.08	.01	.25	.26	.04
In 1896 Less than in 1895.....		.27			0	.34							

* In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

† Mendon for 1877-83; Niles for 1878-81; Nirvana for 1877-79 and to and including April 25, 1880; Reed City for April 26 to end of year 1880 and for 1881-85; Coldwater, Agr'l College for 1877-78, 1880; Otisville for 1878-80; Washington for 1879-83; Petoskey, Woodmere Cemetery for 1878-79; Fife Lake, Ypsilanti for 1877; Ionia for 1880, 1883-84; Adrian for 1880; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Parkville for 1882; Port Austin for 1883-85, 1888-89; Winfield for 1883; Manistique, Mackinaw City, Swartz Creek for 1884-85; Pentwater for 1886; Kalamazoo for 1877-88; Alpena for 1879-87; Marquette for 1880-81, 1883-84, 1886-87; Grand Haven for 1880-84; Escanaba for 1881-85, 1887; Port Huron for 1881-85; Otsego for 1890; Marshall for 1881-92; Albion for 1890-91; Tecumseh for 1877-85, 1894-96; Adrian for 1880, 1894-96; Thornville for 1877-96; Lansing for 1879-96; Ann Arbor for 1880-91, 1893-96; Harrisville for 1881-82, 1885-96; Traverse City for 1882-96; Battle Creek for 1877-80, 1882-84, 1892-96; Rockland for 1891-92, 1894-96.

EXHIBIT 31.—Average Amount of Atmospheric Ozone (Night), by Year and Months, in 1896, compared with Annual and Monthly Averages for 1895, and for the 19 Years, 1877-95. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Ozone by Night.—Degrees of Coloration of Test-paper.†												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 years, 1877-95.	3.63	3.96	4.28	4.25	3.99	3.92	3.64	3.03	3.19	2.98	3.29	3.45	3.86
1895 (9 stations)----	4.09	4.15	4.60	4.65	4.55	4.62	4.16	3.57	4.27	3.49	3.33	3.46	4.24
1896 (9 stations)----	4.16	4.04	4.61	4.64	4.48	4.53	4.40	3.62	4.37	3.54	3.43	3.95	4.29
In 1896 Greater than Av. for 19 years, 1877-95.	.53	.08	.33	.39	.49	.61	.76	.59	1.18	.56	.14	.50	.43
In 1896 Less than Av. for 19 years, 1877-95.													
In 1896 Greater than in 1895.	.07		.01				.24	.05	.10	.05	.10	.49	.05
In 1896 Less than in 1895.		.11		.01	.07	.09							

* The stations represented in Exhibit 31, are the same as those represented in Exhibit 30, relative to day ozone, and named in foot-note of that exhibit.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

OBSERVATIONS FOR OZONE AT LANSING.

Since July 1, 1884, the observations for ozone at Lansing have been taken at the new shelter for meteorological instruments in the southwest part of the Capitol yard. Previous to July 1, 1884, the observations had been taken at the office window. Exhibit E, page 80, of the report for 1885, shows that the average for the month for July, 1884, is greater at each observation—7 A. M. to 2 P. M., 2 P. M. to 9 P. M., and 9 P. M. to 7 A. M., at the shelter for instruments than at the office window. Possibly this fact should be taken into consideration in studying ozone at Lansing through a long period of years.

EXHIBIT 32.—Average Velocity of the Wind in Miles per hour, by Year and Months in 1896, compared with Annual and Monthly Averages for 1895, and for the 14 years, 1882-95. From Registers of the Robinson's Self-Registering Anemometer.* These Averages are for groups of several Stations in Michigan.

Years, etc.	Average Miles per Hour.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1882-95.	9.7	10.8	10.8	10.7	10.4	9.5	7.9	7.9	7.6	8.8	9.7	10.8	11.1
1895 (6 stations)....	10.2	11.8	11.7	12.2	9.3	9.5	8.3	8.4	8.1	10.7	11.9	10.2	10.5
1896 (7 stations)....	9.8	9.8	11.8	12.0	11.2	10.3	7.4	7.6	8.0	9.2	9.0	12.3	9.1
In 1896 Greater than Av. for 14 years, 1882-94.....	.1	-----	1.0	1.3	.8	.8	-----	-----	.4	.4	-----	1.5	-----
In 1896 Less than Av. for 14 years, 1882-95.....	-----	1.0	-----	-----	-----	-----	.5	.3	-----	-----	.7	-----	2.0
In 1896 Greater than in 1895.....	-----	-----	.1	-----	1.9	.8	-----	-----	-----	-----	-----	2.1	-----
In 1896 Less than in 1895.....	.4	2.0	-----	.2	-----	-----	.9	.8	.1	1.5	2.9	-----	1.4

* Gibbon's Anemometer was used at Ann Arbor.

EXHIBIT 33.—Average Velocity of the Wind in Miles per hour, by Months for the 16 Years 1880-95, and comparisons of 1896 with this Average and with the year 1895. From Registers of the Robinson's Self-Registering Anemometer in the Office of the State Board of Health, State Capitol, Lansing, Michigan.

Years, etc.	Miles, by Self-Registering Anemometer.													
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Av. 16 years, 1880-95.	9.8	11.1	11.5	11.3	11.0	9.6	8.2	7.9	7.2	8.6	9.1	10.8	11.2	
1895.....	9.9	12.2	12.6	12.2	9.4	9.9	8.3	8.4	7.1	9.6	10.8	8.9	9.5	
1896.....	9.9	9.2	12.5	11.4	12.3	11.3	7.6	7.0	7.8	8.4	8.8	13.7	9.0	
In 1896 Greater than Av. for 16 years, 1880-95.....	.1	-----	1.0	.1	1.3	1.7	-----	-----	.6	-----	-----	2.9	-----	
In 1896 Less than Av. for 16 years, 1880-95.....	-----	1.9	-----	-----	-----	-----	.6	.9	-----	.2	.3	-----	2.2	
In 1896 Greater than in 1895.....	0	-----	-----	-----	2.9	1.4	-----	-----	.7	-----	-----	4.8	-----	
In 1896 Less than in 1895.....	0	3.0	.1	.8	-----	-----	.7	1.4	-----	1.2	2.0	-----	.5	

TABLE X.—Average Velocity of the Wind in Miles per Hour, for each Hour of the Day, by Months of the Year 1896. Compiled from Registers of the Robinson's Self-Registering Anemometer, exposed above the roof of the Capitol, and registering in the office of the State Board of Health, Lansing, Michigan.

Months.		Averages.		Hours (1896) and Average Miles per Hour.																							
				A. M.								P. M.												A. M.			
				Av. 17 years, 1880-96.	1896.	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7
Year.....	9.8	9.9	9.4	10.0	10.5	11.2	11.7	12.2	12.1	12.2	11.7	11.0	10.3	9.7	9.2	9.3	9.3	8.9	8.9	9.0	8.9	8.7	8.6	8.4	8.4	8.4	8.5
January.....	11.0	12.2	*9.2	8.3	8.6	9.3	10.2	10.6	11.0	10.6	10.3	8.9	8.6	8.4	9.4	9.3	9.2	9.3	9.0	9.3	9.4	9.4	8.7	8.9	8.2	8.0	8.0
February ..	11.6	12.6	+12.5	11.4	11.6	12.4	13.3	14.1	14.4	14.3	14.8	13.7	13.0	12.3	12.3	12.1	12.2	12.6	11.9	11.9	11.8	11.5	11.5	12.3	11.3	11.8	11.9
March	11.3	12.2	11.4	10.4	11.6	12.0	12.7	13.5	14.4	14.5	14.3	14.7	13.9	13.2	11.6	10.8	10.7	10.6	9.7	9.0	9.2	9.3	9.1	9.1	9.6	9.8	
April	11.1	9.4	12.3	12.1	12.5	12.8	13.4	14.1	14.9	15.3	15.6	15.6	14.8	13.6	11.5	10.8	11.0	11.4	11.4	10.9	10.8	10.7	10.2	10.2	10.4	10.7	10.5
May	9.7	9.9	11.3	11.8	12.6	13.4	14.0	14.0	15.0	14.0	14.4	14.6	13.3	12.4	11.1	9.8	9.3	9.7	9.3	9.8	9.7	8.3	8.8	8.9	8.8	9.9	
June	8.2	8.3	7.6	7.6	7.8	7.9	8.3	8.5	8.9	8.6	8.8	8.7	9.3	9.3	8.6	7.7	7.3	7.1	6.6	6.8	6.9	6.6	6.7	6.0	5.4	6.2	
July	7.8	8.4	+7.0	5.8	6.8	7.9	8.3	8.5	9.3	9.2	9.6	9.6	9.1	7.9	6.2	5.6	6.1	6.5	6.5	6.0	6.3	6.1	6.1	5.6	5.0	5.1	4.7
August	7.2	7.1	7.8	7.5	8.0	8.3	9.3	10.5	10.6	10.2	10.4	9.7	8.9	7.8	7.1	6.3	7.4	7.1	7.0	7.1	6.9	6.8	6.7	5.9	6.5	6.2	5.9
September ..	8.6	9.6	†8.4	7.8	8.5	8.9	9.8	10.6	11.0	10.9	10.6	10.4	9.5	8.0	7.6	7.6	7.9	7.6	7.7	7.7	7.6	7.6	7.2	6.9	7.1	7.0	6.8
October	9.1	10.8	8.8	8.4	9.2	10.1	10.5	10.6	11.2	11.1	11.2	10.1	8.6	7.6	8.5	8.2	8.2	7.9	7.4	7.8	8.5	7.9	7.7	7.4	7.6	7.5	7.5
November ..	10.9	8.9	\$37.7	12.8	13.3	13.4	14.4	14.4	14.7	15.1	15.2	15.2	14.5	13.8	14.3	13.8	13.6	13.3	12.5	12.4	13.1	13.5	13.7	13.5	13.1	12.6	12.5
December ..	11.0	9.5	9.0	8.7	8.9	9.5	9.9	10.5	11.0	11.3	10.9	9.7	8.5	9.0	8.7	8.3	8.3	8.5	8.3	8.5	8.1	8.4	8.2	7.9	7.8	8.0	8.1

* For only about 27 days. † For only about 28 days. ‡ For only about 30 days. § For only about 29 days.

The statements in the third figure column in Table X. of the average velocity of the wind in miles per hour, by months, during the year 1896, are graphically represented in Diagram XI. The remaining columns of Table X. for 1896, are graphically represented in Diagram X.

DIAGRAM X.—VELOCITY OF WIND, BY HOURS AND MONTHS. 1896.

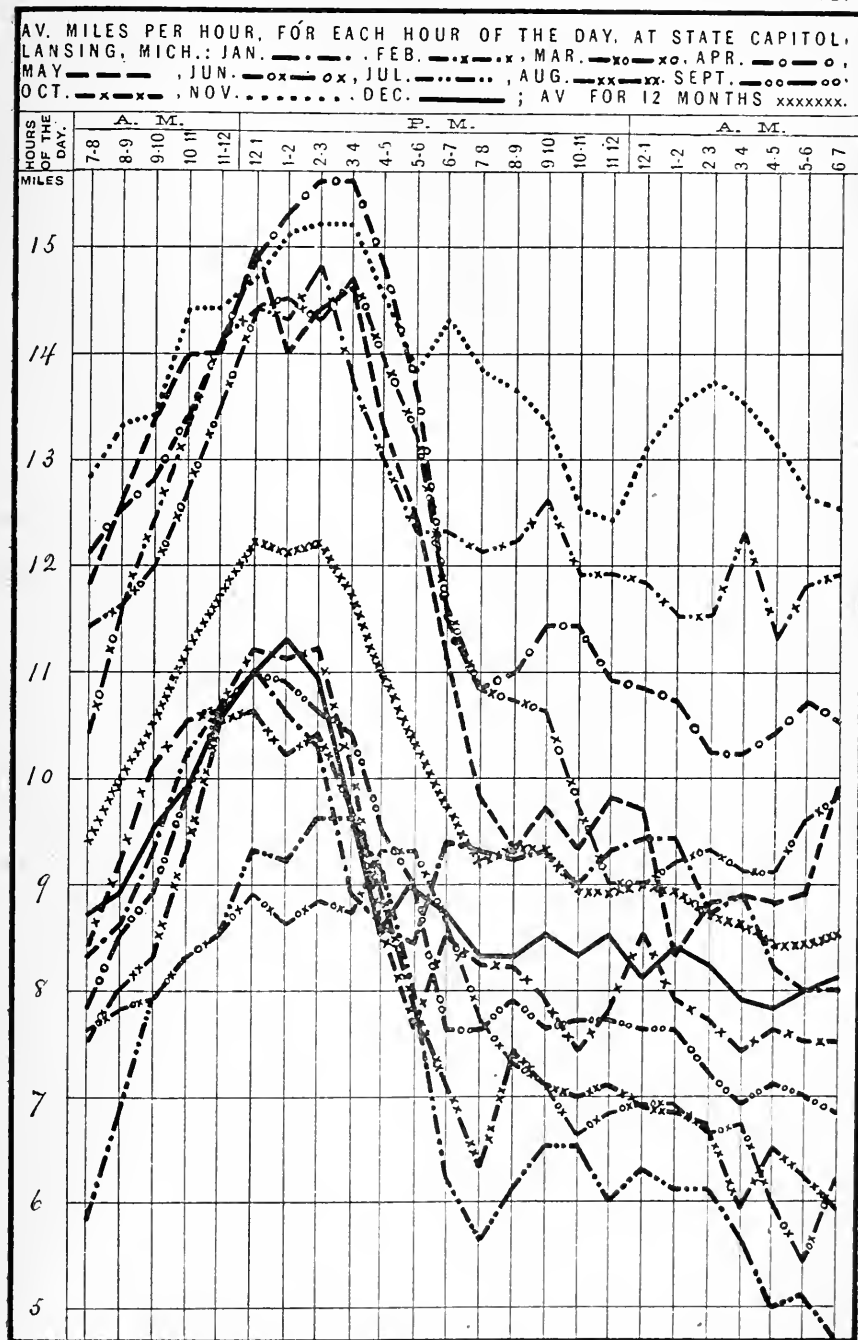


TABLE XI.—*Average Velocity of the Wind in Miles per Hour for the Year and for each Month of the Year 1896, at 8 Stations in Michigan. Computed from Registers of the Robinson's Self-Registering Anemometer,* by Observers for the State Board of Health, and for the U. S. Weather Bureau.*

Stations in Michigan.†	Divisions of the State.	Miles, by Self-Registering Anemometer.													
		Year.		Months, 1896.											
		Norm. ‡	1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 Stations.	-----		9.8	9.8	11.8	12.0	11.2	10.3	7.4	7.6	8.0	9.2	9.0	12.3	9.1
Marquette	U. P.	9.6 ¹¹	10.2	10.3	10.6	12.8	10.7	9.8	7.7	8.3	9.3	11.8	9.9	11.0	9.9
Sault Ste. Marie	U. P.	8.1 ⁵	8.6	8.4	9.0	9.4	9.4	10.0	7.4	6.7	7.3	8.7	8.2	11.2	8.0
Alpena	N. E.	-----	9.6	9.5	11.1	11.3	10.5	10.5	7.7	7.5	8.0	9.5	9.0	11.2	8.8
Grand Haven	W.	10.7 ⁷	10.4	11.1	12.5	11.2	13.0	10.5	7.6	7.7	8.3	9.1	9.6	13.9	9.8
Port Huron	B. & E.	10.6 ¹⁵	11.4	10.8	13.8	15.6	12.0	11.7	8.3	9.6	9.5	10.7	10.6	13.7	10.6
Lausling, S. B. } of H.	C.	9.8 ¹⁷	9.9	9.2	12.5	11.4	12.3	11.3	7.6	7.0	7.7	8.4	8.8	13.7	9.0
Ann Arbor	S. C.	-----	8.1	8.3	11.3	12.0	10.0	7.7	5.3	5.7	5.8	6.4	6.7	10.8	7.1
Detroit	S. E.	10.0 ¹⁵	10.2	10.4	13.2	11.9	11.3	11.1	7.8	8.3	7.9	8.9	9.1	12.8	9.4

* Gibbon's Anemometer was used at Ann Arbor.

† The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit I.

‡ Numbers in this column state the average velocity of the wind in miles per hour for periods of years ending in each case with Dec. 31, 1896. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

Graphic representations of statements made in Table XI., are given in Diagram XI.

The construction and purport of the diagrams relating to direction of wind may be explained as follows:—

In Diagrams XII., XIII., XIV. and XV., relating to the direction of the wind, the single figures or separate groups in lines are designed to indicate by the length of the lines the number and the proportion of regular observations at 7 A. M., 2 P. M. and 9 P. M. daily, at which the wind was blowing from each of the eight principal points of compass at the places and for the periods of time stated in the margin; and by the direction of the lines on the page, the direction of the wind. Each figure consists of lines drawn to a common center from some or all of the following directions on the page and indicating that at the times of observation the wind blew from points of the compass as follows: Lines toward the common center from the top of the page indicate observations that the wind was blowing from the north; from the right-hand side, observations that the wind was from the east; from the bottom of the page, that it was from the south; from the left-hand side, that it was from the west; from the upper left-hand corner, that it was from the northwest; from the upper right-hand corner, that it was from the northeast; from the lower right-hand corner, that it was from the southeast; and from the lower left-hand corner that it was from the southwest. The number of regular observations at which the wind was blowing from the direction denoted by a line as indicated by the length of that line, .01 of an inch being the unit or the length of line for one observation. The circles indicate calms, the number of regular observations at which there was no wind being denoted by the length of the radius of the circle drawn about the point of convergence of the lines for a given place or period of time, the length of one observation being, as before, .01 of an inch. Thus, by Diagram XII., or by Table XIV., it appears that at Ann Arbor in July, 1896, at 6 of the regular tri-daily observations for the month there was a calm; at 26 observations the wind was blowing from the west; at 10 observations, from the northwest; at 6 from the northeast, etc. For convenient study the top of these diagrams should be held toward the north. Definite numerical statements corresponding to these diagrams are given in Tables XII., XIII., and XIV. and Exhibit 34.

DIAGRAM XI.-VELOCITY OF WIND, BY MONTHS, 1896.

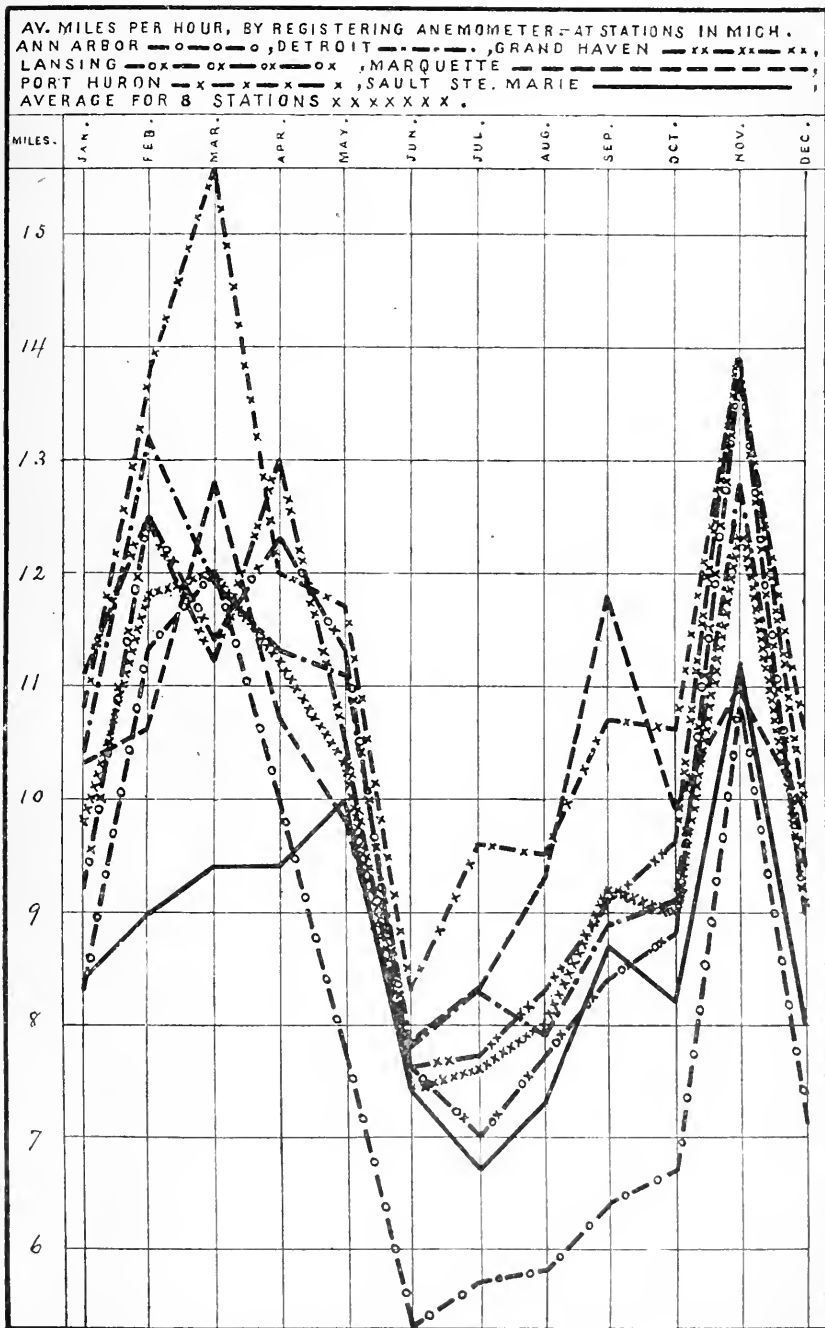


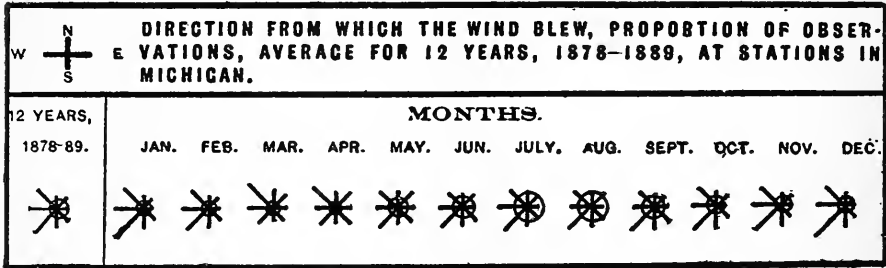
EXHIBIT 34.—DIRECTION OF WIND, 1878-89.—*Number of Observations per month (made tri-daily), at which the wind was blowing from the several (eight) points of Compass.—Annual and Monthly Averages for the 12 years, 1878-89, at Stations in Michigan.**

Points of Compass.	Average Number of Observations per Month—12 Years, 1878-89.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations....	91	93	85	93	90	93	90	93	93	89	92	90	93
Calm	5	4	4	4	4	5	6	8	8	6	5	4	4
North	7	6	6	10	9	8	7	8	8	6	8	6	6
Northeast	8	6	7	10	11	11	9	8	10	7	8	7	5
East	6	5	6	7	8	8	6	5	6	6	5	5	5
Southeast	9	9	9	9	11	11	10	8	9	11	9	7	8
South	10	11	10	7	8	10	11	10	10	12	12	11	11
Southwest	17	22	16	12	12	15	16	18	17	18	18	19	23
West	14	16	14	14	11	12	13	16	12	12	13	17	17
Northwest	14	15	13	19	16	13	11	13	13	12	14	15	14

* At 12 stations in 1878; 16 in 1879; 19 in 1880; 19 in 1881; 21 in 1882; 19 in 1883; 21 in 1884; 21 in 1885; 16 in 1886; 17 in 1887; 13 in 1888; and 11 in 1889.

Graphic representations of statements made in Exhibit 34 are given in Diagram XIII.

DIAGRAM XIII.—WIND, DIRECTION, IN MICH., AVERAGE 12 YEARS, 1878-1889.



* SCALE, RADIUS .01 OF ONE INCH TO ONE OBSERVATION
[Plate 675.]

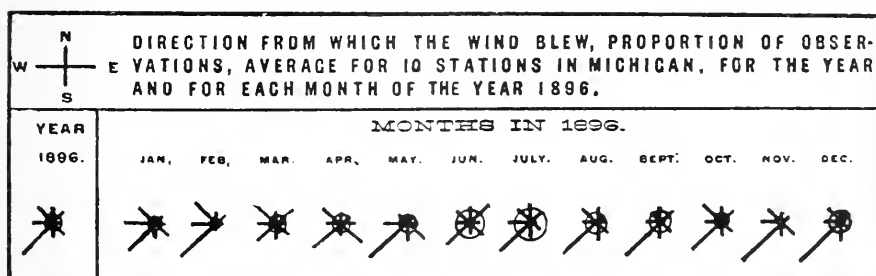
TABLE XII.—*Number of Observations per Month (at 7 A. M., 2 P. M., and 9 P. M., daily), at which the wind was blowing from each of the Eight Principal Points of Compass, during the Year and during each month of the Year 1896, Average for 10 Stations in Michigan.**

Points of Compass.	Average Number of Observations per Month, 1896.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations } (10 stations)..... }	90	92	86	92	88	92	89	90	90	88	91	87	92
Calm	5	4	3	5	5	5	8	9	6	6	5	2	6
North	7	4	6	7	5	4	8	11	8	8	9	4	6
Northeast	8	6	7	12	6	4	13	7	5	10	9	6	7
East	5	6	4	5	8	6	6	3	3	3	4	3	3
Southeast	10	11	4	10	16	13	10	7	9	8	9	10	7
South	9	9	5	9	7	10	7	8	11	10	9	9	11
Southwest	24	21	27	15	20	28	19	23	27	26	23	30	32
West	11	18	14	11	8	14	9	12	9	9	10	12	10
Northwest	12	13	16	19	13	7	10	11	12	8	14	11	10

* The names of observers, their places of observation, and the counties and divisions of the State in which those places are situated, are stated in Exhibit 1.

Graphic representations of statements in Table XII. are given in Diagram XIV.

DIAGRAM XIV.—WIND, DIRECTION, IN MICH., YEAR AND MONTHS, 1896.



[PLATE 907]

TABLE XIII.—Average Number of Observations per Month for the Year 1896, at which the wind was blowing from each of the Eight Principal Points of the Compass, at each of 10 Stations* in Michigan; also the average line for the 10 Stations.

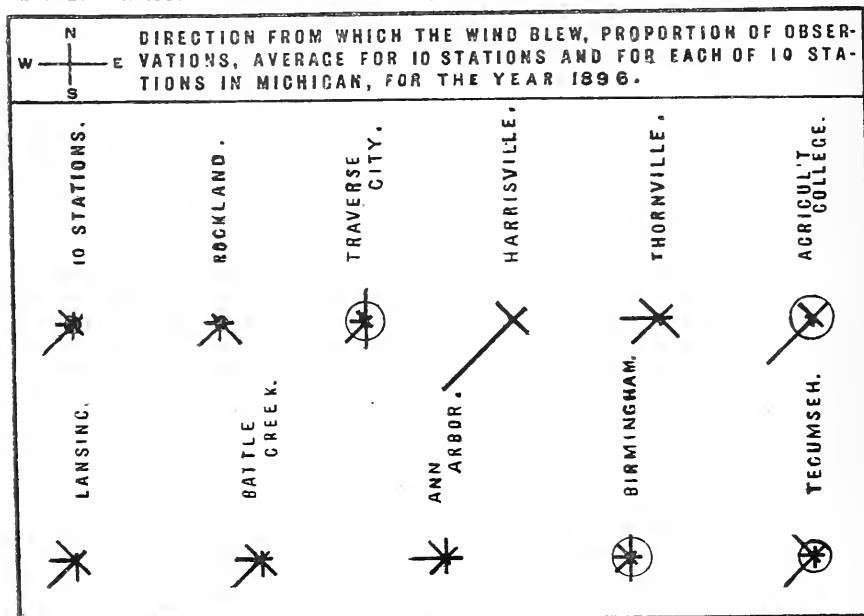
Stations in Michigan.*	Divisions of the State.†	Average Number of Observations per Month, 1896.									
		All Obs.	Calms	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av. for 10 Stations.....		90	5	7	8	5	9	9	24	11	12
Rockland	U. P.	81	4	4	3	8	17	11	18	9	7
Traverse City	N. W.	91	11	19	5	2	5	16	17	8	7
Harrisville	N. E.	92	0	0	10	0	11	0	55	2	14
Thornville	B. & E.	92	0	1	11	6	14	4	20	21	14
Agricultural College	C.	92	12	1	13	2	8	5	35	4	11
Lansing, S. B. of H.	C.	91	0	5	8	2	11	12	22	15	15
Ann Arbor	S. C.	92	2	12	8	8	5	9	13	21	14
Battle Creek	S. C.	91	1	5	7	6	12	10	23	14	12
Tecumseh	S. C.	92	10	6	9	5	5	7	24	8	17
Birmingham	S. E.	86	11	13	3	6	5	14	13	10	10

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I.

† The full names of the divisions and counties in each division, are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

Graphic representations of statements in Table XIII., are given in Diagram XV.

DIAGRAM XV.—WIND. DIRECTION, AT STATIONS IN MICHIGAN, 1896.



DIAGRAMS RELATING TO METEOROLOGICAL CONDITIONS.

Most of the diagrams in this paper are to be read by tracing each irregular line across the diagram from left to right, and noting at what point it intersects each of the perpendicular lines having the name of the month at the top. What station is represented by the irregular line may be learned from the head of the diagram. The degree of value denoted by the intersection may be learned by referring to the figures in the left-hand column. Thus in Diagram I., relating to average temperature in 1896, tracing the line "— . —" representing Harrisville, it may be seen that the average temperature at Harrisville was, in January, 21.96° , in March about 24° , in August about 67° , in October about 44° , etc. Definite numeral statements of the average temperature for each month at each station may be found in Table I., and accompanying each diagram is a table giving exact numerical statements for the conditions represented. The average lines given in each table are represented in the corresponding diagram by an \times line, thus $\times \times \times \times$. The lines in the diagrams give more ready general comparisons of stations with each other, or of months, with each other, than is possible from the mere numerical statements. By Diagram II., it appears at a glance that the average daily range of temperature at Traverse City in 1896 was, during May, greater than at any other of the nine stations represented in that diagram, and during January was less at Thornville. The marked agreement in the course of lines in Diagram I., representing mean monthly temperature at eight stations, and also that the agreement is closer in August, September and October than in the other months, appear at once on reference to the diagram. The resemblance between the lines in Diagram I., relating to mean temperature by months in 1896, and those in Diagram III., relating to absolute humidity of the atmosphere for the same periods, is apparent. By Diagram X., it appears that in every month of the year the highest velocity of the wind (on an average for the month) is reached between 12 m. and 3 p. m., and that the lowest velocity occurs in the latter part of the night or in early morning, and that in 1896 at Lansing, the months of most wind were April and November. By reference to Diagram XI., it may be seen that at other stations in Michigan where records of actual miles of wind traveled were kept, March was in 1896 the month of greatest wind. These statements illustrate the reading of the diagrams for any use it may be desired to make of the tables and diagrams. The four diagrams relating to the direction of the wind are constructed on a different principle and the manner of reading them is explained on preceding pages in this article.

Diagrams XII., XIII., XIV. and XV., relating to the direction of the wind, are constructed on a plan different from that of the other diagrams.

A description of the plan of their construction, method of reading, etc., is printed on a preceding page in this article.

DIAGRAM XII.—WIND, DIRECTION, AT STATIONS, BY MONTHS, 1896.

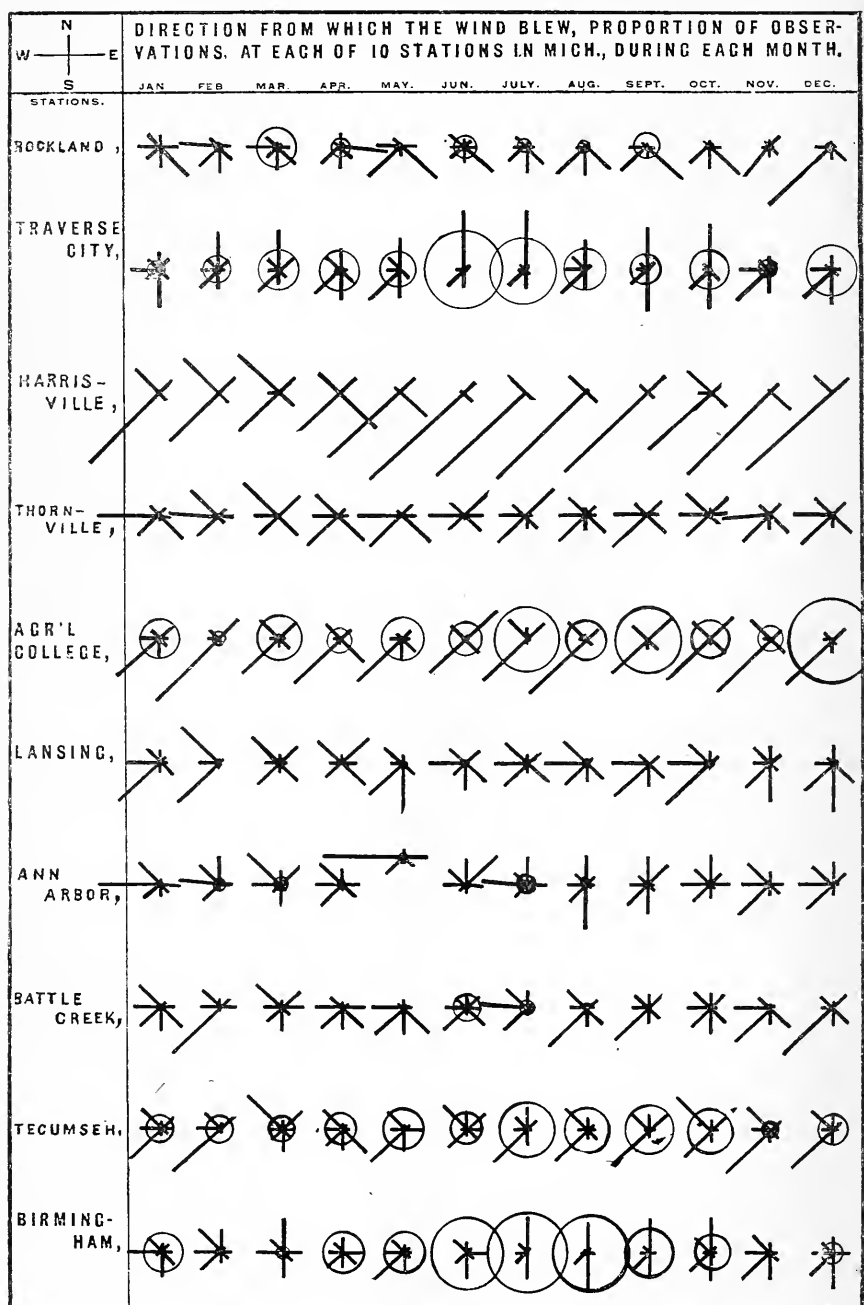


TABLE XIV.—Number of observations for Months and Year 1896, at which the wind was blowing from each of the Eight Principal Points of the Compass, at 10 Stations* in Michigan; also Average Line for 10 of the said Stations from which nearly Complete Observations were received for the Year. (Observations were made at 7 A. M., 2 P. M. and 9 P. M., Daily.)

Stations in Michigan.*	Divisions of the State.*	January.										February.										March.									
		Total.	Cal n.	N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.	Total.	Cal m.	N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.	Total.	Cal m.	N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.			
Av. 10 Stations†.		92	4	4	6	6	11	9	21	15	13	86	3	6	7	4	4	5	27	14	16	92	5	7	12	5	10	9	15	11	19
Rockland-----	U. P.	88	1	7	2	11	23	12	10	12	10	78	3	0	0	7	10	14	15	22	7	87	11	3	3	8	15	13	8	17	9
Traverse City---	N. W.	92	5	10	9	3	8	22	10	16	9	87	8	21	8	4	2	11	14	10	9	92	11	23	11	1	6	9	18	5	8
Harrisville-----	N. E.	93	0	0	11	0	7	0	55	1	19	87	0	0	13	0	8	0	38	1	27	93	0	1	13	0	11	0	31	6	31
Thornville-----	B. & E.	93	0	0	6	6	18	3	17	35	8	87	0	0	7	8	5	2	17	28	20	93	0	0	17	2	16	2	15	14	27
Agri College-----	C.	93	11	1	10	5	6	11	32	11	6	87	4	1	15	0	4	1	49	6	7	93	13	2	13	3	9	5	29	5	14
Lansing, S. B. { of H.-----}	C.	93	0	7	4	4	10	6	32	19	11	84	0	2	3	0	2	4	32	12	29	93	0	5	14	4	15	6	18	9	22
Ann Arbor-----	S. C.	93	0	3	3	12	7	7	8	35	18	87	3	17	2	8	2	4	12	23	16	93	1	8	16	4	4	12	7	16	25
Battle Creek-----	S. C.	93	0	1	4	8	17	14	16	16	17	87	0	5	8	9	1	2	37	11	14	93	0	4	14	13	7	14	12	10	19
Tecumseh-----	S. C.	93	8	4	9	6	5	5	28	12	16	87	8	3	11	1	0	2	36	14	12	93	7	4	15	6	7	13	7	7	27
Birmingham-----	S. E.	88	11	5	6	6	10	14	4	21	11	86	2	13	3	5	5	6	17	16	19	89	4	20	2	11	7	14	4	16	11

* For names of observers, etc., see Exhibit I. For names of divisions, etc., see Exhibit I., in a paper which follows on weekly reports of sickness.

† This line includes all the 10 stations, at which observations were made tri-daily, and from which statements complete, or nearly complete, were received for every month of the year.

NOTE.—Graphic representations of statements for 10 lines in this table are given in Diagram XII., which is explained on a preceding page in this article.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1896.—Observations at which the Wind was blowing from Direction named.*

Stations in Michigan.*	Divi- sions of the State.*	April.										May.										June.									
		Calm.		N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
Av. 10 Stations†.	-----	88	5	5	6	8	16	7	20	8	13	92	5	4	4	6	13	10	28	14	7	89	8	8	13	6	10	7	19	9	10
Rockland-----	U. P.	84	5	9	3	27	9	12	14	1	4	91	3	1	2	10	26	5	24	13	7	85	6	5	5	7	23	9	10	8	12
Traverse City ...	N. W.	90	11	12	2	4	10	18	20	3	10	93	10	18	1	1	6	16	24	7	10	90	22	33	4	0	2	10	13	5	1
Harrisville -----	N. E.	90	0	0	12	0	28	0	33	1	16	93	0	0	12	0	21	0	56	0	4	90	0	0	9	0	7	0	71	2	1
Thornville.....	B. & E	90	0	0	4	5	20	2	25	16	18	93	0	0	9	9	22	0	25	24	4	90	0	0	20	11	13	3	12	20	11
Agri'l College ...	C.	96	7	0	8	1	19	4	36	4	11	93	12	1	7	5	11	11	35	7	4	90	10	0	25	3	11	0	28	2	11
Lansing, S. B { of H. }	C.	90	0	5	21	9	18	0	12	7	18	93	0	5	1	3	10	28	26	7	13	90	0	2	11	2	16	16	10	21	12
Ann Arbor.....	S. C.	90	4	9	3	10	11	4	17	14	18	93	3	6	0	14	8	3	13	45	1	90	2	15	24	10	3	5	5	13	13
Battle Creek.....	S. C.	90	0	3	3	13	17	13	17	15	9	91	0	5	2	5	20	15	22	18	4	90	8	7	10	8	14	5	18	12	8
Tecumseh.....	S. C.	90	9	3	3	4	19	12	14	10	16	93	11	3	5	11	2	13	27	8	13	90	9	11	14	8	7	4	15	3	19
Birmingham ...	S. E.	79	12	8	1	10	9	9	13	9	8	88	12	5	5	4	5	11	24	12	10	85	20	7	4	12	5	15	9	2	11

*† For these references see foot-notes at bottom of first page of this table.

NOTE.—Graphic representations of statements for 10 lines in this table are given in Diagram XII, which is explained on a preceding page in this article.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1896.—Observations at which the Wind was blowing from Direction named.*

Stations in Michigan.*	Divi- sions of the State*	July.										August.										September.									
		Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av 10 stations†		90	9	11	7	3	7	8	23	12	11	90	6	8	5	3	9	11	27	9	12	88	6	8	10	3	8	10	26	9	8
Rockland.....	U. P.	69	4	3	1	4	13	15	13	7	9	76	4	2	4	0	19	16	22	5	4	82	7	3	0	5	27	6	20	10	4
Traverse City.....	N. W.	93	19	33	3	1	3	11	13	5	5	86	12	17	4	0	2	12	19	10	10	90	9	23	7	3	2	24	12	5	5
Harrisville.....	N. E.	93	0	0	1	0	9	0	68	1	14	93	0	0	2	0	9	0	69	0	13	90	0	0	14	0	5	0	64	1	6
Thornville.....	B. & E.	93	0	2	21	3	10	9	22	16	10	93	0	4	7	7	15	10	21	15	14	90	0	1	11	7	15	1	26	19	10
Ag'l College.....	C.	93	18	6	13	0	2	3	34	2	15	93	11	3	9	1	5	2	44	4	14	90	19	0	19	0	8	6	27	0	11
Lansing, S. B. } of H.	C.	93	0	5	10	1	16	6	19	19	17	93	0	3	5	2	13	11	17	24	18	90	0	1	7	1	12	13	27	21	8
Ann Arbor.....	S. C.	93	6	15	6	11	5	4	10	26	10	93	3	17	7	4	3	25	14	11	9	90	0	16	15	3	5	16	16	11	8
Battle Creek.....	S. C.	93	5	10	4	5	4	4	18	27	16	93	0	3	7	4	13	16	31	10	15	89	0	9	12	2	9	10	26	10	11
Tecumseh.....	S. C.	93	15	13	7	3	2	9	26	8	10	93	13	8	5	5	8	5	25	6	18	90	14	9	13	4	1	5	28	3	13
Birmingham.....	S. E.	87	22	21	3	1	2	15	9	7	7	82	20	18	3	4	2	21	10	4	3	80	14	20	2	3	0	15	14	6	6

*† For these references see foot-notes at bottom of first page of this table.

NOTE.—Graphic representations of statements for 10 lines in this table are given in Diagram XII., which is explained on a preceding page in this article.

TABLE XIV.—CONCLUDED.—*Direction of Wind, Months in 1896.—Observations at which the Wind was blowing from Directions named.*

Stations In Michigan.*	Divi- sions of the State.*	October.										November.										December.																								
		Total.					Calm.					Total.					Calm.					Total.					Calm.					Total.					Calm.					Total.				
		N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.		N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.		N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.		N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.		N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.						
		Calm.								Calm.								Calm.									Calm.								Calm.											
Av. 10 Stations†.		91	5	9	4	9	9	23	10	14		87	2	4	6	3	10	9	30	12	11		92	6	6	7	3	7	11	32	10	10														
Rockland	U. P.	72	1	4	3	7	23	12	14	3	5	66	2	5	10	3	8	5	23	5	5		91	3	4	1	3	12	8	48	9	3														
Traverse City.....	N. W.	93	11	26	1	1	8	22	16	3	5	50	5	8	6	3	5	13	25	17	8		92	14	9	1	5	5	19	22	12	5														
Harrisville	N. E.	93	0	0	9	0	12	0	47	7	18	90	0	0	7	1	15	0	65	0	2		93	0	0	13	0	1	1	64	0	14														
Thornville.....	B. & E.	93	0	4	15	10	8	2	18	18	18	90	0	0	9	1	14	9	22	27	8		93	0	0	10	2	14	7	24	22	14														
Agri'l College.....	C.	93	11	0	18	1	11	3	33	2	14	90	7	0	8	2	11	1	42	4	15		93	23	0	10	2	4	7	36	5	6														
Lansing, S. B. { of H.....}	C.	93	0	6	7	1	3	4	33	24	15	90	1	8	9	1	7	22	19	10	13		93	0	11	3	1	15	26	22	10	5														
Ann Arbor.....	S. C.	93	0	17	9	11	4	8	14	17	13	90	1	7	1	8	8	24	16	17	93		93	1	13	10	4	2	6	21	20	16														
Battle Creek.....	S. C.	93	1	9	11	3	12	14	15	44	14	90	0	2	3	3	16	10	27	20	9		93	0	3	11	0	13	11	39	7	9														
Tecumseh.....	S. C.	93	13	6	12	4	1	7	21	2	27	90	5	0	8	0	7	7	35	10	18		93	9	10	7	4	2	7	31	7	16														
Birmingham.....	S. E.	92	10	21	5	3	3	16	16	5	13	83	1	6	2	4	6	15	21	14	14		87	6	10	0	10	3	20	17	12	9														

*† For these references see foot-notes at bottom of first page of this table.

NOTE.—Diagram XII. exhibits lines showing, by months, directions of wind at each of 10 stations in this table; for each month and station the diagram represents the figures given in this table for the same month and stations; it is explained on a preceding page in this article.

TABLE XV.—Average Daily Range of Atmospheric Pressure (as determined from three daily observations) for Months and Year 1896, at 11 Stations, also average line for 9 stations* in Michigan—Stations arranged in order by Latitude, those farthest North first.

Stations in Michigan.*	Average Daily Range of Barometer—Year and Months, 1896.														
	Norm. †	1895.	1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 9 Stations‡.	-----	.201	.206	.226	.307	.286	.176	.186	.135	.145	.156	.232	.131	.254	.235
Rockland -----			e	g	f	e	c	h		i	j	g		b	
			.245	.255	.290	.193	.214	.149		.233	.211	.131		.250	
Traverse City -----	15	.204	.209	a	.281	.301	.172	d	e	d	g	c	a		
				.224	.281	.301	.172	.220	.132	.15	.172	.231	.125	.279	.237
Harrisville -----	2	.219	.211	.229	.307	.266	.177	.209	.119	.142	.164	.254	.123	.294	.246
Thornville -----	13	.205	.211	.234	.321	.291	.172	.182	.140	.144	.160	.227	.139	.266	.254
Agr'l College -----	14	.199	.205	.228	.302	.293	.204	.177	.134	.151	.155	.227	.142	.243	.236
Lansing, S. B. of H. -----	15	.205	.197	.202	.211	.304	.282	.168	.187	.135	.145	.153	.226	.126	.252
				b	.242	.334	.303	b	b	c	b	a	e	b	a
Birmingham -----	10	.210	.209	.219	.242	.334	.303	.187	.194	.153	.180	.158	.261	.133	.248
Battle Creek -----			§				.170	.166	.179	.138	.143	.219	.132	.255	.259
Ann Arbor -----	15	.205	.205	.207	.253	.316	.290	.179	.179	.147	.150	.156	.222	.131	.239
Tecumseh -----	5	.194	.187	.188	.169	.277	.266	.155	.148	.123	.139	.139	.215	.130	.244
Adrian -----	3	.197	.196	.199	.212	.317	.284	.172	.174	.134	.146	.144	.223	.132	.223

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1. The average atmospheric pressure at each of these stations, by months, in 1896, is given in Table XVII.

† Numbers in this column state the average daily range of atmospheric pressure for periods of years ending in each case with Dec. 31, 1896. The small figures above and at the right of numbers which state the average daily range, denote the number of years included in the average.

‡ Not including Rockland and Battle Creek.

¶ The average for 10 months is .220.

§ For 9 months, .185.

a For 30 days.

b For 29 days.

c For 28 days.

d For 27 days.

e For 26 days.

f For 25 days.

g For 24 days.

h For 22 days.

i For 20 days.

j For 19 days.

NOTE.—The latitude and elevations of some of the stations in Table XV. are stated in Exhibit 2.

The daily range is found by subtracting the lowest observation from the highest observation, 7 A. M. to 7 A. M.

TABLE XVI.—*Range of Atmospheric Pressure (as determined from 3 Daily Observations) for the Year and for each Month and for the Average Month of the Year 1896, at 9 and at each of the 9 Stations, and Average Line for 9 Stations in Michigan; also the Norm.—Average Monthly range for a series of years. Stations named in order by Latitude, those farthest North first.*

Stations in Michigan.	Range of Barometer.—Year and Months. 1896.															
	Norm. †	1895.	1896.	Av. Month.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
For 9 Stations†.....	.....	1.893	1.760	1.321	1.680	1.578	1.498	1.277	1.288	.969	.881	1.076	1.335	1.150	1.520	1.597
Av. for 9 Stations*.....	.....	1.462	1.343	.884	1.051	1.169	1.075	.901	.804	.617	.499	.734	.952	.815	1.012	.981
Rockland.....				\$	e .939	f .971	f 1.497	e 1.024	b 1.010	h .450	k .727	i .825	j .788	g .707		b 1.055
Traverse City ¹⁵	.958	1.759	1.245	.909	1.014	1.167	1.226	.962	d .851	e .625	b .471	f .737	c .931	a .850	1.048	1.029
Harrieville .....	.936 ²	1.610	1.304	.929	1.012	1.188	1.125	.964	1.072	.543	.576	.748	.946	.843	1.041	1.095
Thornville.....	.947 ¹³	1.426	1.363	.922	.996	1.199	1.111	.858	.855	.639	.493	.798	.983	.800	1.209	1.123
Agr'l College.....	.887 ¹⁴	1.354	1.430	.737	.883	1.044	1.041	.890	.672	.617	.428	.756	1.069	.826	.224	.391
Lansing, S. B. } of H. }	.908 ¹⁵	1.415	1.417	.869	1.415	1.268	.849	.932	.662	.531	.679	.601	.657	.953	.981	.903
Birmingham ...	.923 ¹⁰	1.455	1.355	.918	1.069	1.246	1.092	.948	.849	.642	.497	.760	.986	.727	1.150	1.053
Battle Creek.....								.871	.638	.595	.409	.671	1.029	.708	1.230	.988
Ann Arbor.....	.909 ¹⁵	1.405	1.297	.916	1.080	1.159	1.181	.851	.779	.783	.440	.744	1.035	.774	1.122	1.049
Tecumseh.....	.878 ⁵	1.335	1.368	.874	.984	1.151	1.012	.825	.683	.589	.454	.684	.986	.809	1.200	1.111
Adrian.....	.860 ³	1.402	1.307	.882	1.008	1.096	1.034	.879	.817	.583	.452	.779	.977	.752	1.135	1.072

† Numbers in this column state the average monthly range of atmospheric pressure for a period of years ending in each case with December 31, 1896. The small figures above and at the right of the numbers which state the average, denote the number of years included in the average.

‡ Represents the difference between the highest of 9 stations and the lowest of 9 stations for year and for each month of year, not including Rockland, and Battle Creek.

¶ Represents sum of ranges at 9 stations divided by 9.

§ The average for 11 months is .908. || For 9 months, .793.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days. h For 23 days. i For 22 days. j For 21 days. k For 18 days.

NOTE.—The statements in the star (*) foot-note to Table XV. apply also to Table XVI.

EXHIBIT 35.—Average Atmospheric Pressure, by Year and Months, in 1896, Compared with Annual and Monthly Averages for 1895, and for the 19 years, 1877-95. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Average Atmospheric Pressure.—Inches of Mercury.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 years, 1877-95	29.126	29.152	29.164	29.132	29.120	29.095	29.097	29.115	29.136	29.175	29.154	29.150	29.148
1895 (9 stations)....	29.125	29.044	29.126	29.119	29.125	29.135	29.184	29.125	29.077	29.136	29.152	29.201	29.072
1896 (9 stations)....	29.137	29.208	28.979	29.149	29.161	29.078	29.105	29.134	29.152	29.129	29.153	29.175	29.214
In 1896 Greater than Av. for 19 years, 1877-95.....	.001	.056	.....	.017	.041	.....	.008	.019	.016	.....	.....	.025	.066
In 1896 Less than Av. for 19 years, 1877-95.....	.....	.....	.185	.....	.....	.017	.....	.....	.....	.046	.001	.....	.....
In 1896 Greater than in 1895.....	.012	.164	.....	.030	.036	.....	.....	.009	.075	.....	.001	.....	.142
In 1896 Less than in 1895.....	.....	.....	.147	.....	.....	.057	.079	.....	.....	.007	.....	.026	.....

* Woodmere Cemetery (near Detroit) for 1877-79; Mendon for 1877-78, 1881-83; Benton Harbor for 1877-78; Ypsilanti for 1877, 1879; Otisville for 1878-80, 1882; Washington for 1879-80, 1882-83; Nirvana for 1879 and in 1880 to April 25 inclusive; Reed City for 1880 after April 25 and 1881-85; Hastings for 1882; Hillsdale for 1882-83; Manistiquia for 1884-85; Mackinaw City for 1884-87; Ionia for 1884-85; Swartz Creek for 1885; Port Austin for 1883-84, 1888-89; Marquette for 1879-84, 1886-87; Escanaba for 1880, 1882-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1878-87; Kalamazoo for 1877-82, 1885-89; Alma for 1880; Battle Creek for 1877-80, 1882, 1888-89, 1891-94; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Albion for 1890-91; Rockland for 1891-92, 1894; Harrisville for 1882, 1885-92, 1895-96; Tecumseh for 1879-80, 1882-85, 1890, 1892-96; Birmingham for 1887-96; Lansing for 1879-96; Agricultural College for 1877, 1881-96; Thornville for 1880-81, 1884-96; Ann Arbor for 1881-96; Traverse City for 1882-96; Adrian for 1884-96.

EXHIBIT 36.—Comparisons of the Average Atmospheric Pressure during the Year and during each Month of the Year 1896, with Averages for the 21 Years, 1875-95, and for the Year 1895. Corrected for Temperature and for Instrumental Error. Observations made at 7 A. M., 2 P. M. and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.

Years, etc.	Average Atmospheric Pressure.—Inches of Mercury.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 21 years, 1875-95	29.066	29.067	29.069	29.038	29.044	29.033	29.046	29.069	29.083	29.116	29.075	29.078	29.074
1895	29.030	28.953	28.992	29.051	29.049	29.085	29.138	29.089	29.037	29.145	29.071	29.109	28.995
1896	29.047	29.104	28.903	29.039	29.054	29.022	29.047	29.057	29.074	29.051	29.077	29.099	29.034
In 1896 Greater than Av. for 21 years, 1875-95		.037		.001	.010		.001				.002	.021	
In 1896 Less than Av. for 21 years, 1875-95	.019		.166			.011		.012	.009	.065			.040
In 1896 Greater than in 1895		.151			.005			.037			.006		.039
In 1896 Less than in 1895	.013		.089	.012		.063	.091	.032		.094		.010	

TABLE XVIII.—Average Atmospheric Pressure for Months and Year 1896, at 11 Stations in Michigan; also Average line for 9 Stations, as indicated by the height, in inches, of Mercury in the Barometer. Corrected for Temperature.—Reduced to 32° F. (For some stations not corrected for instrumental errors*).—Average of Observations made Daily at 7 A. M., and 9 P. M., by observers † for the State Board of Health.

Stations in Michigan.†		Inches of Mercury.—Atmospheric Pressure.														
		Years.		Months, 1896.												
				Norm. ‖	1896.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 9 Stations ¶			29.137	29.208	28.979	29.149	29.161	29.078	29.105	29.134	29.152	29.129	29.153	29.175	29.214	
Rockland				e	f	f	e	b	h	k	i	j	g		b	
			**	28.712	28.499	28.700	28.687	28.562	28.667	28.713	28.659	28.712	28.730		28.731	
Traverse City		15	29.317	29.412	29.204	29.361	29.324	29.198	29.282	29.330	29.330	29.319	29.326	29.316	29.406	
Harrisville		2	29.332	29.413	29.194	29.355	29.374	29.278	29.316	29.339	29.318	29.317	29.353	29.336	29.386	
Thornville		17	28.986	29.051	28.827	28.984	29.020	28.932	28.960	28.975	28.969	28.980	28.997	29.027	29.077	
Agricultural College		15	29.047	29.104	28.903	29.039	29.054	29.022	29.047	29.057	29.074	29.051	29.077	29.069	29.034	
Lansing, S. B. of H.		18	29.066	29.157	28.933	29.086	29.109	29.027	29.054	29.083	29.111	29.081	29.100	29.113	29.180	
Adrian		3	29.136	29.220	29.000	29.145	29.166	29.090	29.101	29.134	29.162	29.138	29.165	29.207	29.248	
Ann Arbor		16	29.032	29.044	29.110	28.763	29.103	29.073	28.966	29.010	29.043	29.075	29.041	29.063	29.138	
Battle Creek			††				28.967	28.863	28.911	28.948	28.970	28.942	28.980	29.010	29.046	
Toecumseh		5	29.161	29.229	29.029	29.155	29.186	29.100	29.115	29.151	29.173	29.146	29.167	29.218	29.265	
Birmingham		10	29.108	29.179	28.938	29.113	29.147	29.055	29.059	29.098	29.124	29.090	29.128	29.174	29.196	
		11	29.111													

* A correction has been made for instrumental error of barometer at Agricultural College; .013 has been subtracted from each monthly average during the year 1896. At Ann Arbor .004 has been added to each monthly average. For other stations the instrumental error of barometer is not known.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I.

‡ The full names of divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

§ Numbers in this column state the average annual atmospheric pressure for periods of years ending in each case with December 31, 1896. The small figures at the right of the numbers which state the average, denote the number of years included in the average.

¶ This line is an average for 9 stations, at which observations were made tri-daily, and from which reports, nearly complete, were received for every month in the year. It does not include Rockland and Battle Creek. Green's standard barometer was used at all the 11 stations for 1896.

** The average for 11 months is 28.670.

†† For 9 months, 28.963.

NOTE.—Computations of monthly averages for the year 1896 were furnished by the observer at Ann Arbor. The remainder of the computations were made at the office of the State Board of Health.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days. h For 23 days. i For 22 days. j For 21 days.

The lines for 9 stations in this table are graphically represented in Diagram XVI.

EXHIBIT 37.—Average Daily Range of Atmospheric Pressure, by Year and Months, in 1896, compared with Annual and Monthly Averages for 1895, and for the 14 Years, 1882-95. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Average Daily Range of Barometer.—Year and Months, 1896.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept	Oct	Nov.	Dec.
Av. 14 years, 1882-95	.211	.205	.306	.256	.217	.165	.135	.127	.131	.165	.212	.248	.268
1895 (9 stations)....	.201	.316	.266	.238	.152	.150	.117	.157	.135	.193	.241	.212	.236
1896 (9 stations)....	.206	.226	.307	.286	.176	.186	.135	.148	.156	.232	.131	.254	.235
In 1896 Greater than Av. for 14 years, 1882-95.....	-----	-----	.001	.030	-----	.021	0	.021	.025	.067	-----	.006	-----
In 1896 Less than Av. for 14 years, 1882-95.....	.005	.079	-----	-----	.041	-----	0	-----	-----	-----	.081	-----	.033
In 1896 Greater than in 1895.....	.005	-----	.041	.048	.024	.036	.018	-----	.021	.039	-----	.042	-----
In 1896 Less than in 1895.....	-----	.090	-----	-----	-----	-----	-----	.009	-----	-----	.110	-----	.001

* Port Austin for 1883-84, 1888-89; Kalamazoo for 1886-89; Mackinaw City for 1884-87; Reed City for 1882-85; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Swartz Creek for 1885; Marquette for 1882-84, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit for 1883-87; Alma for 1890; Albion for 1890-91; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Battle Creek for 1888-89, 1892-94; Traverse City, Lansing, Ann Arbor for 1882-96; Agricultural College for 1883-96; Thornville for 1884-96; Harrisville for 1885-92, 1895-96; Birmingham for 1887-96; Tecumseh for 1882-85, 1890, 1892-96; Rockland for 1891-92, 1894; Adrian for 1894-96.

EXHIBIT 38—Range of Atmospheric Pressure, by Year and Months, in 1896, compared with Annual and Monthly Averages for 1894, and for the 14 Years, 1882-95. These Averages are for Groups of several Stations in Michigan.*

Years, etc.	Range of Barometer.—Year and Months, 1896.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 14 years, 1882-95	.962	1.285	1.336	1.127	1.049	.804	.706	.595	.601	.792	1.017	1.116	1.140
1895 (9 stations)----	.888	1.446	1.225	.916	.925	.667	.562	.720	.527	.660	1.039	.968	1.000
1896 (9 stations)----	.884	1.051	1.169	1.075	.901	.804	.617	.499	.734	.956	.815	1.012	.981
In 1896 Greater than Av. for 14 years, 1882-95-----						0			.133	.164			
In 1896 Less than Av for 14 years, 1882-95-----	.078	.234	.167	.052	.148	0	.089	.096			.202	.104	.159
In 1896 Greater than in 1895-----				.159		.137	.055		.207	.296		.044	
In 1896 Less than in 1895-----	.004	.395	.056		.024			.221			.224		.019

* Reed City for 1882-85; Port Austin for 1883-84, 1888-89; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Mackinaw City for 1884-87; Swartz Creek for 1885; Marquette for 1882-84, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit for 1883-87; Kalamazoo for 1888-89; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Albion for 1890-91; Rockland for 1892; Tecumseh for 1882-85, 1892-96; Traverse City, Lansing, Ann Arbor for 1882-96; Agricultural College for 1883-96; Thornville for 1884-96; Harrisville for 1885-92, 1895-96; Birmingham for 1887-96; Adrian for 1894-96.

SUNSHINE AND CLOUDS.

On the back of each blank register supplied by this Board to observers, on which they are to register meteorological data, is a statement that "One observer has reported a record of days 'all or nearly all cloudy' and days 'all or nearly all sunshine.' The State Board of Health would be glad to have such a report from all observers who can conveniently make it. Memoranda may be made in a column headed 'cloudy or sunny,' days more than 80 per cent of clouds being marked with the abbreviation 'C,' indicating *cloudy*, and days with less than 20 per cent of clouds with an 'S,' indicating *sunshine*."

The following are statements of the days in each month which were reported "Sunny," "Clear," "Fair," "Partly cloudy," and "Cloudy," by observers at stations in Michigan, except Thornville, concerning which notes are given explaining the method of statement.

ROCKLAND.

JANUARY.—Sunny, 20, 21, 22, 26, 27, 28—6 days. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 23, 24, 25, 29, 30, 31—25 days.

FEBRUARY.—Sunny, 1, 2, 3, 8, 12, 16, 20, 21, 22, 24, 27—11 days. Cloudy, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 18, 19, 23, 25, 26, 28, 29—18 days.

MARCH.—Sunny, 2, 4, 8, 9, 10, 11, 12, 13, 14, 16, 17, 19, 20, 22, 23, 24, 26, 27, 30—19 days. Cloudy, 1, 3, 5, 6, 7, 15, 18, 21, 25, 28, 29, 31—12 days.

APRIL.—Sunny, 3, 4, 6, 7, 8, 12, 13, 15, 19, 20, 22, 23, 27—13 days. Cloudy, 1, 2, 5, 9, 10, 11, 14, 16, 17, 18, 21, 23, 24, 25, 28, 29, 30—17 days.

MAY.—Sunny, 1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 22, 24, 25, 29, 30, 31—22 days. Cloudy, 2, 5, 16, 17, 18, 23, 26, 27, 28—9 days.

JUNE.—Sunny, 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30—27 days. Cloudy, 8, 24, 25.

JULY.—Sunny, 1, 2, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 27, 29—21 days. Cloudy, 3, 4, 11, 12, 14, 28, 30—7 days.*

AUGUST.—Sunny, 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 24, 30, 31—22 days. Cloudy, 4, 20, 22, 23—4 days.*

SEPTEMBER.—Sunny, 3, 6, 7, 8, 11, 12, 19, 20, 22, 23, 26, 27, 28, 29, 30—15 days. Cloudy, 1, 2, 4, 5, 9, 10, 13, 14, 15, 16, 17, 18, 21, 24, 25—15 days.

OCTOBER.—Sunny, 1, 2, 3, 4, 10, 11, 12, 13, 14, 15, 22, 23, 26—13 days. Cloudy, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 23, 24, 27, 28, 29, 30, 31—18 days.

NOVEMBER.—Sunny, 29, 30. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 23, 24, 25, 26, 27, 28—24 days.*

DECEMBER.—Sunny, 1, 2, 9, 10, 11, 12, 14, 15, 22, 24, 26, 27, 28, 29, 30—15 days. Cloudy, 3, 4, 5, 6, 7, 8, 13, 16, 17, 18, 19, 20, 21, 23, 25, 31—16 days.

SAULT STE. MARIE.

JANUARY.—Clear, 5, 21, 22, 23, 27—5 days. Partly cloudy, 3, 13, 14. Cloudy, 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 15, 16, 17, 18, 19, 20, 23, 24, 25, 28, 29, 30, 31—23 days.

FEBRUARY.—Clear, 2, 15, 16, 20, 22, 24—6 days. Partly cloudy, 8, 9, 13, 17, 19, 21, 27, 29—8 days. Cloudy, 1, 3, 4, 5, 6, 7, 10, 11, 12, 14, 18, 23, 25, 26, 28—15 days.

MARCH.—Clear, 2, 3, 4, 9, 10, 11, 12, 13, 14, 19, 20, 23, 27—13 days. Partly cloudy, 1, 15, 17, 22, 26, 28, 30, 31—8 days. Cloudy, 5, 6, 7, 8, 16, 18, 21, 24, 25, 29—10 days.

APRIL.—Clear, 4, 7, 8, 16, 19, 22—6 days. Partly cloudy, 3, 5, 6, 9, 15, 20, 21, 25—8 days. Cloudy, 1, 2, 10, 11, 12, 13, 14, 17, 18, 23, 24, 26, 27, 28, 29, 30—16 days.

MAY.—Clear, 3, 4, 6, 8, 19, 20, 22—7 days. Partly cloudy, 1, 5, 7, 9, 10, 11, 12, 13, 15, 16, 23, 27, 30, 31—14 days. Cloudy, 2, 14, 17, 18, 21, 24, 25, 26, 28, 29—10 days.

* No record for the rest of the month.

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JUNE.—Clear, 1, 2, 3, 4, 6, 10, 11, 13, 14, 15, 17, 18, 20, 22, 23, 26, 27, 28, 29—19 days. Partly cloudy, 5, 9, 12, 16, 19, 21, 24, 30—8 days. Cloudy, 7, 8, 25.

JULY.—Clear, 1, 7, 8, 16, 17, 21, 25, 28, 30, 31—10 days. Partly cloudy, 2, 6, 9, 10, 11, 12, 13, 15, 18, 19, 20, 23, 24, 27—14 days. Cloudy, 3, 4, 5, 14, 22, 26, 29—7 days.

AUGUST.—Clear, 2, 4, 6, 7, 9, 12, 13, 16, 17, 19, 21, 24, 27—13 days. Partly cloudy, 3, 5, 10, 11, 14, 18, 23, 25, 26, 28, 30, 31—12 days. Cloudy, 1, 8, 15, 20, 22, 29—6 days.

SEPTEMBER.—Clear, 1, 2, 22, 28. Partly cloudy, 3, 4, 6, 7, 8, 9, 13, 15, 17, 18, 20, 21, 23, 24, 26, 27—16 days. Cloudy, 2, 5, 10, 11, 12, 14, 16, 19, 25, 29, 30—11 days.

OCTOBER.—Clear, 1, 2, 3, 4, 7, 8, 9, 11, 12, 14—10 days. Partly cloudy, 6, 10, 13, 15, 16, 17, 18, 19, 20, 26, 27—11 days. Cloudy, 5, 21, 22, 23, 24, 25, 28, 29, 30, 31—10 days.

NOVEMBER.—Clear, 0. Partly cloudy, 3, 6, 8, 10, 28—5 days. Cloudy, 1, 2, 4, 5, 7, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30—25 days.

DECEMBER.—Clear days, 6. Partly cloudy, 9. Cloudy, 16.

PORT HURON.

JANUARY.—Clear, 4, 5, 15, 29—4 days. Partly cloudy, 11, 12, 16, 17, 21, 26, 27, 28—8 days. Cloudy, 1, 2, 3, 6, 7, 8, 9, 10, 13, 14, 18, 19, 20, 22, 23, 24, 25, 30, 31—19 days.

FEBRUARY.—Clear, 5, 11, 14, 17, 20, 21, 22, 27—8 days. Partly cloudy, 2, 7, 8, 12, 18, 23, 24, 25, 26, 28, 29—11 days. Cloudy, 1, 3, 4, 6, 9, 10, 13, 15, 16, 19—10 days.

MARCH.—Clear, 12, 13, 14, 15, 16, 23, 27, 29, 30, 31—10 days. Partly cloudy, 3, 4, 5, 6, 8, 9, 17, 20, 21, 22, 24, 25, 26, 28—14 days. Cloudy, 1, 2, 7, 10, 11, 18, 19—7 days.

APRIL.—Clear, 5, 8, 12, 13, 14, 15, 16, 25, 26—9 days. Partly cloudy, 1, 4, 6, 18, 20, 21, 22, 23, 24, 28—10 days. Cloudy, 2, 3, 7, 9, 10, 11, 17, 19, 27, 29, 30—11 days.

MAY.—Clear, 1, 3, 7, 8, 9, 10, 13, 15, 16, 22, 24, 26, 29, 31—14 days. Partly cloudy, 2, 4, 5, 6, 11, 12, 14, 17, 19, 20, 21, 30—12 days. Cloudy, 18, 23, 25, 27, 28—5 days.

JUNE.—Clear, 1, 2, 4, 5, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 22, 23, 26, 27, 30—19 days. Partly cloudy, 3, 6, 21, 25, 28, 29—6 days. Cloudy, 7, 8, 9, 15, 24—5 days.

JULY.—Clear, 1, 2, 6, 7, 8, 11, 12, 16, 17, 21, 25, 28, 30, 31—14 days. Partly cloudy, 3, 5, 10, 14, 15, 18, 20, 23, 27, 29—10 days. Cloudy, 4, 9, 13, 19, 22, 24, 26—7 days.

AUGUST.—Clear, 3, 5, 9, 11, 12, 13, 14, 16, 17, 20, 23, 24, 25, 27, 28, 29, 31—17 days. Partly cloudy, 2, 4, 6, 7, 8, 15, 18, 19, 26—9 days. Cloudy, 1, 10, 21, 22, 30—5 days.

SEPTEMBER.—Clear, 1, 7, 8, 10, 15, 20, 23, 24—8 days. Partly cloudy, 2, 3, 4, 9, 11, 13, 16, 17, 18, 19, 21, 25, 26, 28—14 days. Cloudy, 5, 6, 12, 14, 22, 27, 29, 30—8 days.

OCTOBER.—Clear, 2, 3, 4, 8, 9, 10, 11, 14, 15, 18, 22, 23, 24, 26, 27—15 days. Partly cloudy, 5, 7, 13, 19, 20, 25, 28, 29, 31—9 days. Cloudy, 1, 6, 12, 16, 17, 21, 30—7 days.

NOVEMBER.—Clear, 1, 3, 11, 13, 14, 16, 22, 30—8 days. Partly cloudy, 2, 6, 7, 9, 12, 15, 19, 26, 27, 28, 29—11 days. Cloudy, 4, 5, 8, 10, 17, 18, 20, 21, 23, 24, 25—11 days.

DECEMBER.—Clear, 2, 3, 12, 21—4 days. Partly cloudy, 1, 6, 9, 11, 13, 16, 17, 18, 19, 24, 25, 28—12 days. Cloudy, 4, 5, 7, 8, 10, 14, 15, 20, 22, 23, 27, 29, 30, 31—15 days.

THORNVILLE.

In the following statement relative to Thornville, are named for each of the months, January to December, the days of the month "sunny," "fair" and "cloudy" (the *per cent* of sunshine having been recorded for each day), the days were named sunny when the sky was three-tenths or less than three-tenths covered with clouds; fair, when the sky was four-tenths to seven-tenths (inclusive) covered; cloudy, when the sky was more than seven-tenths covered, as observed by J. S. Caulkins, M. D., Thornville.

JANUARY.—Sunny, 1, 3, 4, 5, 15, 26, 27, 29—8 days. Cloudy, 2, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 28, 30, 31—23 days.

FEBRUARY.—Sunny, 2, 14, 16, 17, 20, 21, 22, 23, 26, 27—10 days. Partly cloudy, 5, 24, 25, 28—4 days. Cloudy, 1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 15, 18, 19, 29—15 days.

MARCH.—Sunny, 2, 3, 4, 12, 13, 14, 20, 22, 23, 24, 25, 27, 28, 29, 30, 31—16 days. Partly cloudy, 1, 5, 9, 16, 17, 18, 21, 26—8 days. Cloudy, 6, 7, 8, 10, 11, 15, 19—7 days.

JUNE.—Sunny, 1, 2, 3, 4, 5, 6, 10, 11, 12, 13, 14, 16, 17, 18, 19, 22, 23, 25, 26, 27, 28, 29, 30—23 days. Partly cloudy, 7, 21. Cloudy, 8, 9, 15, 20, 24—5 days.

JULY.—Sunny, 1, 3, 4, 6, 7, 8, 11, 12, 14, 15, 16, 17, 18, 25, 28, 29, 30, 31—18 days. Partly cloudy, 2, 5, 10, 20, 21—5 days. Cloudy, 9, 13, 19, 22, 23, 24, 26, 27—8 days.

AUGUST.—Sunny, 2, 3, 5, 7, 13, 14, 16, 17, 18, 19, 20, 24, 25, 27, 28, 29, 30, 31—18 days. Partly cloudy, 6, 8, 11, 12, 15, 22, 26—7 days. Cloudy, 1, 4, 9, 10, 21, 23—6 days.

SEPTEMBER.—Sunny, 1, 4, 7, 8, 20, 23, 24, 26, 29, 30—10 days. Partly cloudy, 3, 10, 11, 15, 16, 17, 18, 19, 21, 25, 27—11 days. Cloudy, 2, 5, 6, 9, 12, 13, 14, 22, 25—9 days.

OCTOBER.—Sunny, 2, 3, 4, 5, 8, 9, 10, 11, 14, 20, 22, 23, 24, 25, 26, 27—16 days. Partly cloudy, 13, 15, 18, 19, 29, 31—6 days. Cloudy, 1, 6, 7, 12, 16, 17, 21, 28, 30—9 days.

NOVEMBER.—Sunny, 1, 2, 6, 14, 15, 16, 18, 22, 30—9 days. Partly cloudy, 3, 8, 11, 19—4 days. Cloudy, 4, 5, 7, 9, 10, 12, 13, 17, 20, 21, 23, 24, 25, 26, 27, 28, 29—17 days.

DECEMBER.—Sunny, 1, 2, 11, 12, 16, 19, 23, 27—8 days. Partly cloudy, 3, 9, 10, 14, 17, 21, 24, 28, 30—9 days. Cloudy, 4, 5, 6, 7, 8, 13, 15, 18, 20, 22, 23, 26, 29, 31—14 days.

ANN ARBOR.

JANUARY.—Sunny, 1, 3, 4, 5, 16, 27, 29—7 days. Fair, 11, 15. Cloudy, 2, 6, 7, 8, 9, 10, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 30, 31—22 days.

FEBRUARY.—Sunny, 11, 16, 17, 20—4 days. Fair, 14, 26, 27, 28, 29—5 days. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 18, 19, 21, 22, 23, 24, 25—20 days.

MARCH.—Sunny, 2, 3, 4, 5, 12, 13, 14, 20, 22, 24, 27, 29, 30, 31—14 days. Fair, 17, 21, 23. Cloudy, 1, 6, 7, 8, 9, 10, 11, 15, 16, 18, 19, 25, 26, 28—14 days.

APRIL.—Sunny, 4, 5, 6, 8, 12, 14, 15, 16, 21, 22, 25—11 days. Fair, 2, 7, 11, 17, 18, 19, 20, 24, 26, 27, 30—11 days. Cloudy, 1, 3, 9, 10, 13, 23, 28, 29—8 days.

MAY.—Sunny, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 17, 26, 29—15 days. Fair, 1, 2, 14, 21, 22, 23, 24, 28, 31—9 days. Cloudy, 16, 18, 19, 20, 25, 27, 30—7 days.

JUNE.—Sunny, 1, 2, 10, 11, 12, 13, 16, 17, 18, 26, 28, 29, 30—13 days. Fair, 4, 7, 8, 14, 15, 19, 20, 21, 22, 25, 27—11 days. Cloudy, 3, 5, 6, 9, 23, 24—6 days.

JULY.—Sunny, 1, 2, 6, 7, 11, 12, 17, 30—8 days. Fair, 3, 4, 5, 8, 10, 15, 16, 20, 23, 24, 25, 27, 28, 29, 31—15 days. Cloudy, 9, 13, 14, 18, 19, 21, 22, 26—8 days.

AUGUST.—Sunny, 3, 4, 5, 23, 24, 25, 27, 28, 29—9 days. Fair, 7, 8, 9, 11, 14, 15, 16, 17, 18, 19, 20, 21, 26, 30, 31—15 days. Cloudy, 1, 2, 6, 10, 12, 13, 22—7 days.

SEPTEMBER.—Sunny, 1, 4, 7, 8, 20, 23—6 days. Fair, 3, 9, 10, 11, 12, 15, 16, 17, 18, 19, 21, 24—12 days. Cloudy, 2, 5, 6, 13, 14, 22, 25, 26, 27, 28, 29, 30—12 days.

OCTOBER.—Sunny, 2, 3, 4, 9, 11, 14, 15, 22, 25, 26, 27, 31—12 days. Fair, 5, 7, 8, 10, 13, 20, 23, 24, 28—9 days. Cloudy, 1, 6, 12, 16, 17, 18, 19, 21, 29, 30—10 days.

NOVEMBER.—Sunny, 1, 14. Fair, 2, 3, 6, 12, 13, 15, 16, 19, 22, 24, 26, 30—12 days. Cloudy, 4, 5, 7, 8, 9, 10, 11, 17, 18, 20, 21, 23, 25, 27, 28, 29—16 days.

DECEMBER.—Sunny, 2, 11, 24. Fair, 1, 10, 12, 13, 16, 17, 19, 21, 23, 25—10 days. Cloudy, 3, 4, 5, 6, 7, 8, 9, 14, 15, 18, 20, 22, 26, 27, 28, 29, 30, 31—18 days.

LANSING.

JANUARY.—Sunny, 5, 7, 27. Partly cloudy, 29. Cloudy, 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 30, 31—27 days.

FEBRUARY.—Sunny, 14, 16, 17, 22, 26, 27—6 days. Partly cloudy, 5, 6, 11, 18—4 days. Cloudy, 1, 2, 3, 4, 7, 8, 9, 10, 12, 13, 15, 19, 20, 21, 23, 24, 25, 28, 29—19 days.

MARCH.—Sunny, 2, 4, 14, 20, 27, 29, 30, 31—8 days. Partly cloudy, 3, 5, 11, 12, 13, 17, 21, 22, 23, 24—10 days. Cloudy, 1, 6, 7, 8, 9, 10, 15, 16, 18, 19, 25, 26, 28—13 days.

APRIL.—Sunny, 4, 5, 6, 15, 16, 22, 24, 25—5 days. Partly cloudy, 3, 7, 8, 12, 14, 17, 21, 26, 29—9 days. Cloudy, 1, 2, 9, 10, 11, 13, 18, 19, 20, 23, 27, 28, 30—13 days.

MAY.—Sunny, 1, 3, 6, 7, 8, 9, 10, 15, 17, 20—10 days. Partly cloudy, 4, 11, 12, 13, 19, 23, 24, 26, 29, 31—10 days. Cloudy, 2, 5, 14, 16, 18, 21, 22, 25, 27, 28, 30—11 days.

JUNE.—Sunny, 1, 2, 10, 11, 13, 14, 22, 23, 29, 30—10 days. Partly cloudy, 4, 5, 6, 8, 12, 17, 18, 21, 25, 26, 28—11 days. Cloudy, 3, 7, 9, 15, 16, 19, 20, 24, 27—9 days.

JULY.—Sunny, 1, 7, 10, 11, 12, 16, 17, 22, 29, 30—10 days. Partly cloudy, 2, 6, 8, 25, 31—5 days. Cloudy, 3, 4, 5, 9, 13, 14, 15, 18, 19, 20, 21, 23, 24, 26, 27, 28—16 days.

AUGUST.—Sunny, 5, 6, 7, 11, 16, 17, 24, 25, 26, 27, 28, 29—12 days. Partly cloudy, 8, 9, 10, 18, 23, 31—6 days. Cloudy, 1, 2, 3, 4, 12, 13, 14, 15, 19, 20, 21, 22, 30—13 days.

SEPTEMBER.—Sunny, 1, 7, 8, 9, 10, 19, 20, 23, 24, 25, 26, 27—12 days. Partly cloudy, 3, 4, 15, 17—4 days. Cloudy, 2, 5, 6, 11, 12, 13, 14, 16, 18, 21, 22, 28, 29, 30—14 days.

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OCTOBER.—Sunny, 2, 3, 4, 9, 11, 14, 24, 26, 27—9 days. Partly cloudy, 10, 13, 15, 16, 18, 22, 23, 25, 28, 30, 31—11 days. Cloudy, 1, 5, 6, 7, 8, 12, 17, 19, 20, 21, 29—11 days.

NOVEMBER.—Sunny, 1. Partly cloudy, 2, 3, 6, 9, 13, 14, 15, 16, 30—9 days. Cloudy, 4, 5, 7, 8, 10, 11, 12, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29—20 days.

DECEMBER.—Sunny, 2, 11, 24. Partly cloudy, 1, 3, 5, 9, 10, 12, 13, 16, 18, 23, 25, 27—12 days. Cloudy, 4, 6, 7, 8, 14, 15, 17, 19, 20, 21, 22, 26, 28, 29, 30, 31—16 days.

MARQUETTE.

JANUARY.—Clear days, 3. Partly cloudy, 4. Cloudy, 21.

FEBRUARY.—Clear days, 3. Partly cloudy, 10. Cloudy, 16.

MARCH.—Clear days, 3. Partly cloudy, 10. Cloudy, 18.

APRIL.—Clear days, 3. Partly cloudy, 10. Cloudy, 17.

MAY.—Clear days, 5. Partly cloudy, 15. Cloudy, 11.

JUNE.—Clear days, 11. Partly cloudy, 14. Cloudy, 5.

JULY.—Clear days, 7. Partly cloudy, 15. Cloudy, 9.

AUGUST.—Clear days, 11. Partly cloudy, 11. Cloudy, 9.

SEPTEMBER.—Clear days, 3. Partly cloudy, 10. Cloudy, 17.

OCTOBER.—Clear days, 5. Partly cloudy, 10. Cloudy, 16.

NOVEMBER.—Clear days, 3. Partly cloudy, 4. Cloudy, 23.

DECEMBER.—Clear days, 5. Partly cloudy, 9. Cloudy, 17.

DETROIT.

JANUARY.—Clear days, 6. Partly cloudy, 5. Cloudy, 20.

FEBRUARY.—Clear days, 6. Partly cloudy, 9. Cloudy, 14.

MARCH.—Clear days, 11. Partly cloudy, 12. Cloudy, 8.

APRIL.—Clear days, 12. Partly cloudy, 10. Cloudy, 8.

MAY.—Clear days, 15. Partly cloudy, 13. Cloudy, 3.

JUNE.—Clear days, 13. Partly cloudy, 13. Cloudy, 4.

JULY.—Clear days, 14. Partly cloudy, 11. Cloudy, 6.

AUGUST.—Clear days, 11. Partly cloudy, 15. Cloudy, 5.

SEPTEMBER.—Clear days, 6. Partly cloudy, 18. Cloudy, 6.

OCTOBER.—Clear days, 17. Partly cloudy, 6. Cloudy, 8.

NOVEMBER.—Clear days, 6. Partly cloudy, 6. Cloudy, 18.

DECEMBER.—Clear days, 6. Partly cloudy, 8. Cloudy, 17.

THE TIME OF GREATEST PREVALENCE OF EACH DISEASE.

CONTRIBUTIONS TO THE STUDY OF THE CAUSES OF SICK- NESS.

A STATISTICAL REPORT BASED ON WEEKLY REPORTS OF SICKNESS
IN MICHIGAN DURING THE YEAR 1896, AND PRECEDING YEARS.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF
HEALTH.

This paper is the twentieth in a series of articles upon the same general subject begun in the latter part of 1876. It presents a summary of the compilation of weekly reports of sickness in Michigan in 1896. It includes a series of diagrams or graphic illustrations which show by months in 1896, the rise and fall of twenty-eight of the most prominent diseases in Michigan.

Propositions are stated as to the relations of specified meteorological conditions, and diseases are mentioned under these propositions in such manner as to suggest one method of studying some of the facts brought out in the compilation.

Tables are given showing the per cent of the weekly *reports* which stated the presence of the various diseases, first (in Exhibit IV.), for each of the years, 1884-1896, and an average for the nineteen years, 1877-1895, also for the ten years, 1886-1895, and secondly (in Exhibit IV., continued), by months, in each of the years 1895, 1896, and the average for the period of nineteen years, 1877-1895, also for the period of ten years, 1886-1895, the diseases being arranged in the order of their greatest reported prevalence in 1896, to facilitate a comparison with the prevalence of the same diseases in previous years, and in corresponding months in previous years.

The per cent of *observers* stating the presence of each of the diseases is given in Table 1, for the year 1896, and, for comparison, for each of the years 1884-1895, and, in Table 1, continued, for the months in the year 1896, and, for comparison, by months in the year 1895, and the average by months for the period of nineteen years, 1877-1895, also for the period of ten years, 1886-1895.

Comparing Table 1, with Exhibit IV., we see the correspondence in the two lines of evidence,—that of the “prevalence” of the diseases as shown by the per cent of *reports*, and the “area of prevalence” as shown by the per cent of *observers*, the diseases following each other in a somewhat similar order from highest to lowest—the diseases being arranged in the table, as in the exhibit, in the order of their greatest reported prevalence in 1896.

One of the objects of this compilation is to learn the time of the greatest and of the least prevalence of each of the more important diseases in the

State, and to note the connection of this prevalence with each of the meteorological conditions in the State. Casual observation shows that certain diseases are much more prevalent in the hot months, while certain other diseases are much more prevalent in the cold months. The relation between these diseases and the atmospheric temperature is well marked, but accurate statistics are needed to show just what that relation is. We find, also, that other meteorological conditions than atmospheric temperature have a marked effect upon many of the diseases, apparently diminishing the effect of temperature in some instances, increasing its effect in other instances. For these reasons the State Board of Health undertakes, by a compilation of the weekly reports of sickness in connection with the various meteorological conditions, to learn what constant, and, therefore, probably causal relations exist between the humidity of the air, the ozone, the velocity of the wind, the atmospheric pressure, etc., and the increased or diminished prevalence of each disease in certain months as compared with other months in the same year, or with the same months in other years or series of years.

Since 1876, when this system of "weekly reports of sickness" was begun, an important work has been accomplished in learning the time of the greatest prevalence of each of several of the most important diseases, and consequently the time of greatest danger from each such disease, in the State considered as a unit. To facilitate the study of the causes of sickness and deaths, the State is divided into eleven geographical divisions, a list of which, and the counties embraced in each, appear in Exhibit 1.

Physicians' Weekly Reports of Sickness.

Weekly reports are now received concerning twenty-eight diseases, the names of which are printed on the blank postal used for the weekly report; and concerning these twenty-eight diseases a positive report is made each week by each of many of the leading physicians in Michigan.

Great credit is due the busy medical practitioners in Michigan who forward these reports of sickness. Some of them have made the reports regularly since this plan was adopted in 1876. The service is, as a rule, without compensation; a few health officers have slight pay from their local boards of health. Each one should have full compensation. No other class of persons has knowledge of the facts that are necessary in the compilation of health statistics; and it is greatly to the credit of physicians that they are so willing to coöperate in every effort made to advance the public health.

Plan of the Weekly Card-reports.

The plan of the weekly reports remains the same as last year. (Cards having *Pleuritis* printed on them were first used for weekly reports in October, 1887.) Observers now report only the diseases under their own personal observation. Previous to the year 1885, some of the observers reported such diseases as they believed to be present in their locality, even though not under their own observation. The change in method of making the reports may account partially for the apparent decrease in sickness in 1896, when compared with the average for the nineteen years, 1877-95. Details of the method of securing and the plan of marking these reports may be thus stated:—

The blanks for the weekly reports are printed on postal cards, which are supplied to the observers of diseases. Blank record books in which to preserve copies of the reports, remarks, etc., are also supplied to these observers, to be retained by them. The reports are forwarded weekly to the Secretary of the State Board of Health at Lansing.

The plan of making the report is as follows: Each observer is requested to mark the disease of which there was the greatest number of cases under his observation during the week for which the report is made, 1; that of which there was the next greatest number of cases, 2; the next, 3; and so on, applying consecutive numbers to the diseases reported present; but marking with the same figure all diseases of which there is the same number of cases; to write 0 opposite each disease mentioned of which there was no case; to apply these numbers without regard to the severity of the cases; to include all cases, without regard to when they were taken sick, so long as they are actually sick with the given disease; to include all cases "under the observation" of the observer. A blank is left on the card for the convenience of those observers who prefer to state the number of cases rather than the order of prevalence by the foregoing method.

To illustrate the method of making the reports, the following copy of one of the blanks now in use is given, correctly marked, in the "prevalence" column, for the number of cases stated on the right-hand margin. It should be remembered that the numbers in the "prevalence" column denote simply the relative order in which the several diseases appear to be prevalent, and do not denote a definite number of cases; so that a disease might one week be marked 4, and the following week, with the same number of cases, be marked 1. Names of diseases and figures printed in italics are not printed on the postal blanks, but are supposed to have been written on the report by the observer.

Diseases in.....and vicinity.

PLEASE DATE.

week ending Sat.,....., 189.....

DISEASES, CASES OBSERVED.		Prevalence Order. See a	No. of Cases.
Ed. 41.			
REMARKS:— a. Please mark the disease of which there is the greatest number of cases, 1; the disease having next greatest number of cases, 2; the next, 3; and so on for each disease, writing the same figures opposite diseases having the same number of cases. Write 0 opposite each disease of which there is no case under your observation. [For full statement of plan, see second, third, and fourth pages of record-book cover.] A blank indicates that the item has been overlooked. If this report includes a contagious disease, please mention, on the bottom or margin of this card, the township, city, or village in which the disease is. Please mail this, signed and dated, as soon as convenient after close of week specified.	Brain, Inflammation of.....	14	1
	Bowels, Inflammation of.....	12	3
	Bronchitis.....	11	4
	Cerebro-spinal Meningitis..	0	0
	Cholera Infantum.....	8	9
	Cholera Morbus.....	10	6
	Consumption, Pulmonary..	10	6
	Croup, Membranous.....	12	3
	Diphtheria.....	5	14
	Diarrhea.....	3	17
	Dysentery.....	8	9
	Erysipelas.....	13	2
	Fever, Intermittent.....	2	21
	Fever, Remittent.....	11	4
	Fever, Typhoid (Enteric)..	0	0
	Fever, Typho-malarial.....	9	7
	Influenza.....	7	11
	Kidney, Inflammation of...	14	1
	Measles.....	1	27
	Neuralgia.....	14	1
	Pleuritis.....	0	0
	Pneumonia.....	9	7
	Puerperal Fever.....	0	0
	Rheumatism.....	6	12
	Scarlatina.....	4	16
	Small-pox.....	0	0
	Tonsillitis.....	11	4
	Whooping-cough.....	0	0
	Mumps.....	6	12
	Dyspepsia.....	11	4

Bulletins of Health in Michigan.

During the year 1896 the issue of the weekly and monthly bulletins of "Health in Michigan" has been continued. These bulletins are compiled from the regular weekly card reports of physicians in all parts of the State, and from the health officers' reports of communicable diseases, which reports are made to the Secretary of the State Board of Health in compliance with law.

The bulletins give to the members of the State Board of Health, local health officers, and when published to the public, information concerning the "diseases which cause most sickness" in the State, the relative amount of sickness from each disease, and comparisons with the preceding week or month, thus showing any sudden increase or decrease which may have occurred in the prevalence of any disease, together with a comparison of the various meteorological conditions; also (in the monthly bulletin) a comparison with the average month for a series of years, also (in the weekly bulletin) lists of the localities in which each of the dangerous communicable diseases is reported present, which lists if widely published would serve to put people intending to visit such places on their guard against such diseases.

The bulletins are an immediate ephemeral use of some of the data supplied by the reports from localities, which data finally go to make up the permanently-valuable sickness statistics, and the communicable-disease statistics of Michigan; but even this ephemeral use has been the means of disseminating among the people of Michigan much information useful for the restriction and prevention of sickness and deaths.

There are fifteen hundred and eighty-five local health officers in Michigan, and nearly every one of them contributes some fact, and some of them very many facts, useful for the promotion of the public health. The State Board of Health serves to collect these facts, group them so as to make them most useful, and give them all out again to every locality for the general good.

A copy of the weekly bulletin has been sent to such editors as have expressed a desire to have it for use, entire or in part, in their papers; and copies of the monthly bulletin have been sent to the sanitary and medical journals which are received as exchanges by the library of the State Board of Health.

About fifty copies of the weekly bulletin were mailed each week, and about one hundred and ten copies of the monthly bulletin were mailed each month, during the year 1896.

As a rule, about five-eighths of the card reports reach the Office of the State Board of Health in time for compilation in the weekly bulletin, and the monthly bulletins are compiled from the information used in the weekly bulletins. It is found that the statements made in the monthly bulletins are corroborated by the information, after the close of the year, from the compilation of the whole number of the reports for the corresponding months of the year.

Annual Compilation of the Weekly Reports.

The reports from each locality are compiled by months. The average of the numbers stating the order of prevalence of the several diseases for the month is considered an indication of the actual order of prevalence

of the diseases for that time. There is also found for each locality what per cent of the reports state the presence of each disease for the given month. This per cent of reports for a single locality indicates what part of the month the disease was present in that locality. It may also be called the per cent of weeks the disease was present. These first results of the compilation are stated in Table 3, which, on account of the space required, has not been printed in the reports since that of 1882, but is preserved in the office of the State Board for reference and study.

A combination of the statements for localities in Table 3, is made by months for the State, so far as it is represented by the localities from which reports are received, showing: (1) What per cent of the observers reported each disease each month; (2) for the localities at which a given disease was reported, an average of the per cent of weeks it was reported at those localities; (3) what per cent of all the reports received for the month stated the presence of each disease; (4) an average of the numbers denoting the order of prevalence of each disease at the localities at which it was reported present during the month.

The Prevalence of the Several Diseases in 1896.

By noting the per cent of all the reports received for a given time which stated the presence of each disease, the relative prevalence of the several diseases may be readily seen. This per cent has been computed for each disease, by months for the year 1896. It is thus stated in Exhibit II., which also states the per cent for each disease for the year 1896, and an average for the period of nineteen years, 1877-1895, also for the period of ten years, 1886-1895. What per cent of the reports stated the presence of each disease by months in 1896, is graphically represented in Diagrams 1-5 on following pages.

For twenty diseases a comparison has been made of the amount of sickness in 1896 (as indicated by the proportion of reports stating the presence of the disease) with the average amount for a period of nineteen years, also for a recent period of ten years. These comparisons are shown in Exhibits XI., XIII., XVIII., and XX. A comparison is made in Table 1, between the per cents of observers reporting the tabulated diseases present in each of the years 1884-1896, and by months in two of those years; also an average by months for the period of nineteen years, 1877-1895, also for the period of ten years, 1886-1895. In Exhibit IV., the per cents of reports stating the presence of each of the twenty-eight tabulated diseases, for each of the years 1884-1896, and an average by months for the years 1895 and 1896, and for the period of nineteen years, 1877-1895, also for the period of ten years, 1886-1895, is given. In Table 1, and in Exhibit IV., the diseases are arranged in the order of the greatest per cents for 1896, the highest being placed first.

A study of the reported sickness from twenty-one diseases, in connection with meteorological conditions by months in 1896, is made in Exhibit X., and following exhibits. By arranging months in order of greatest prevalence of the disease under consideration, noting whether it is more or less prevalent than the average for the year, and noting what were the meteorological conditions for the same months as compared with the average for the year, relations and comparisons are grouped for convenient comparison. A summary of one line of the evidence presented by these exhibits is given in Exhibits XXV. and XXVI.

In Exhibits VI. and VII., on subsequent pages, the leading diseases are arranged in order according to the amount of sickness reported from them in 1896, those from which there was most sickness reported being placed first. In these exhibits the diseases are arranged with reference to the per cent of reports taken in connection with the average order of prevalence.

The comparison with former years is facilitated by reference to Exhibit II., Table 1, Exhibit IV., and Exhibits XI., XIII., XVIII., and XX.

Exhibit IV., is continued for 1896. In it the diseases are arranged in order of the greatest per cent of reports stating the presence of the diseases in 1896, the highest per cent being placed first in the line. It is similar in form to Table 1. which shows the per cent of observers by whom diseases were reported present. It affords a means of comparing the diseases showing greatest prevalence with those showing greatest area of prevalence or widest distribution. It affords also a means for the comparison of per cent of reports in 1896, with the average per cent of reports in the nineteen years, 1877-1895, also in the ten years, 1886-1895, both for the year and by months, also by months in 1896 with the year 1895.

Diseases from which there was a Marked Increase or Decrease in Prevalence in Michigan in 1896.

By referring to Exhibits II. and IV., it will be seen that there was no disease which showed a marked increase in 1896 over the average for the nineteen years, 1877-1895; the diseases in which the decrease in 1896 appears most marked, when compared with the above-mentioned average, are intermittent fever, remittent fever, pneumonia, measles, typho-malarial fever, diphtheria, consumption, erysipelas, scarlet fever, dysentery, cholera morbus, cholera infantum and whooping-cough.

A part of the lessened prevalence of some of the prominent diseases may be due to the change in the method of reporting sickness, referred to in the last paragraph on page 84.

A comparison of 1896 with the average for the ten years, 1886-1895, shows that there was no disease which showed a marked increase in 1896; the diseases in which the decrease appears most marked in 1896, when compared with the last-named average, are intermittent fever, erysipelas, remittent fever, typho-malarial fever, whooping-cough, consumption, pneumonia and dysentery.

Method of Comparison of Diseases by Years, Months, and Weeks.

In the Annual Reports ending with that for 1888, mention was made of diseases in which a difference of seven or more was shown between the per cents of reports stating the presence of the disease in the current year and in the preceding year or term of years; in the Reports since that for 1888 those diseases were mentioned of which the comparison showed an increase or decrease of twenty-five per cent from the preceding year, or from the normal, as the case may be.

In this report, those diseases which are reported by seven or more observers, and which show an increase or decrease of twenty-five per cent are generally mentioned, except in cases of cholera, small-pox, typhus fever or other particularly interesting or dangerous disease, and these are specially considered in each instance.

This rule was adopted also for the weekly and monthly bulletins, "Health in Michigan," beginning with Feb. 1893. In Exhibits XI., XII., XIII., and XIV., the per cent of reports by months in 1896 is placed directly under the per cents for the corresponding months in 1895. A comparison between the corresponding months in the two years is thus made possible, and the comparison of the months in 1896 with the averages for the months in the series of years preceding is made possible by placing the differences, greater or less, in separate lines.

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EXHIBIT I.—*Eleven Geographical Divisions of the State, formed for the purpose of facilitating the study of Causes of Sickness and of Deaths, with a list of Counties included in each Division.*

1—Upper Peninsular.	2—Northwest- ern.	3—Northern.	4—Northeast- ern.	5.—Western.	6.—Northern Central.	7.—Bay and Eastern.	8.—Central.	9.—S.uth- western.	10.—Southern Central.	11 —South- eastern.
Algor.	Benzie.	Antrim.	Alcona.	Kent.	Claro.	Arenac.	Barry.	Allegan.	Branch.	Macomb.
Baraga.	Gr. Traverse.	Charlevoix.	Alpena.	Lake.	Gladwin.	Bay.	Clinton.	Berrien.	Calhoun.	Mouroo.
Chippewa.	Leelanau.	Cheboygan.	Iosco.	Mason.	Isabella.	Huron.	Eaton.	Cass.	Hillsdale.	Oakland.
Delta.	Manistee.	Crawford.	Montmorency.	Muskegon.	McCusta.	Lapeer.	Genesee.	Van Buren.	Jackson.	Wayne.
Dickinson.	Wexford.	Emmet.	Ogemaw.	Newaygo.	Midland.	Saginaw.	Gratiot.		Kalamazoo.	
Gogebie.		Kalkaska.	Oscoda.	Oceana.	Roscommon.	Sanilac.	Ingham.		Louavee.	
Houghton.		Otsego.	Presque Isle.	Ottawa.	Missaukee.	St. Clair.	Ionia.		St. Joseph.	
Iron.					Oscoda.	Tuscola.	Livingston.		Washtenaw.	
Keweenaw.							Montcalm.			
Luce.							Shiawassee.			
Mackinac.										
Marquette.										
Menominee.										
Ontonagon.										
Schoolcraft.										

On pages 201 and 217 of the Report of this Board for 1886, the divisions and the counties in each were indicated by lines on maps of the State.

EXHIBIT II.—*Stating for each of 28 Diseases for the Year ending Saturday, January 2, 1897, by Months of the Year 1896, the average for the period of nineteen years, 1877-95, and the average for the period of ten years, 1886-95, on what Per Cent of the reports received each Disease was stated to be present.—Compiled from weekly reports by the Health Officers of Cities and Villages, by Regular Correspondents of the State Board of Health, and by other physicians.**

Diseases.	What Per Cent of the Reports received stated the Presence of the Disease.															
	Av. 1877- 1895.	Av. 1886- 1895.	Av. Year 1896.	Months, 1896												
				Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Average disease †.....	26	23	18	19	19	20	17	16	16	17	18	18	17	17	17	
Brain, inflammation of.....	5	4	3	2	5	2	3	4	3	2	2	1	0.3	3	4	
Bowels, inflam'ation of.....	14	14	10	7	7	12	9	10	12	13	15	8	10	7	10	
Bronchitis.....	59	56	51	59	60	59	56	45	39	36	35	46	53	59	61	
Cerebro-spi. meningitis.....	4	2	1	0.5	1	1	0	1	2	1	2	2	1	2	2	
Cholera infantum.....	12	12	8	1	1	0.7	1	4	9	20	29	18	4	1	1	
Cholera morbus.....	17	15	11	3	2	2	3	7	16	27	36	21	6	4	2	
Consumption, pul.....	54	45	23	22	24	22	21	26	24	22	25	25	22	22	21	
Croup, membranous.....	5	3	1	2	0.7	0.3	0	1	0	0	0	1	1	2	2	
Diphtheria.....	15	8	5	5	5	2	1	3	3	2	3	6	10	12	9	
Diarrhea.....	45	44	34	24	23	22	19	23	37	56	65	58	36	23	15	
Dysentery.....	18	16	11	4	4	3	6	5	11	21	33	24	13	3	3	
Erysipelas.....	21	19	12	14	15	15	13	13	13	11	11	12	10	9	13	
Fever, intermittent.....	54	36	19	14	13	13	21	23	23	24	23	23	22	17	15	
Fever, remittent.....	37	26	16	21	15	15	10	14	15	17	22	20	17	15	14	
Fever, typhoid (enteric).....	11	10	10	10	10	3	3	3	6	9	16	24	17	11	4	
Fever, typho-malarial.....	16	9	2	0.8	0.3	0.7	0.4	1	0.6	2	4	5	6	2	1	
Influenza.....	41	41	44	60	78	79	55	30	22	18	16	27	39	49	58	
Kidney, inflam'ation of.....	20	19	16	22	24	18	19	17	14	13	11	13	14	15	15	
Measles.....	11	9	7	2	7	11	10	17	14	9	2	1	2	3	4	
Neuralgia.....	64	62	54	65	62	64	57	50	50	44	43	45	56	59	57	
Pleuritis.....	17	16	20	21	27	19	16	15	11	6	14	11	18	17		
Pneumonia.....	31	26	18	23	30	39	26	11	13	10	7	7	12	18	20	
Puerperal fever.....	4	4	2	2	2	1	3	4	2	1	1	1	3	0.3	2	
Rheumatism.....	67	66	60	62	63	62	67	61	55	54	52	54	60	65	63	
Scarlet fever.....	14	11	8	16	10	11	9	5	5	6	5	6	3	6	12	
Small-pox.....	0.7	0.2	4	0	2	3	1	0	0	0	0	0	0	0	0	
Tonsillitis.....	47	46	45	57	52	49	46	37	32	33	30	40	47	56	58	
Whooping-cough.....	16	12	7	8	9	9	8	7	11	8	4	5	5	2	2	
Total No. reports rec'd.....	\$382	\$424	\$328	370	305	298	277	298	313	374	300	377	326	312	390	

* For 1896 the names of observers are stated in Exhibit V.

† This line is an average for such of the tabulated diseases as were reported present in the given month or year.

§ Averages per month.

‡ An average for the period 1883-1895.

Statements in this exhibit for months in 1896 are graphically represented in Diagrams 1, 2, 3, 4, 5, opposite this page, and on following pages.

DIAGRAM 1—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1896.

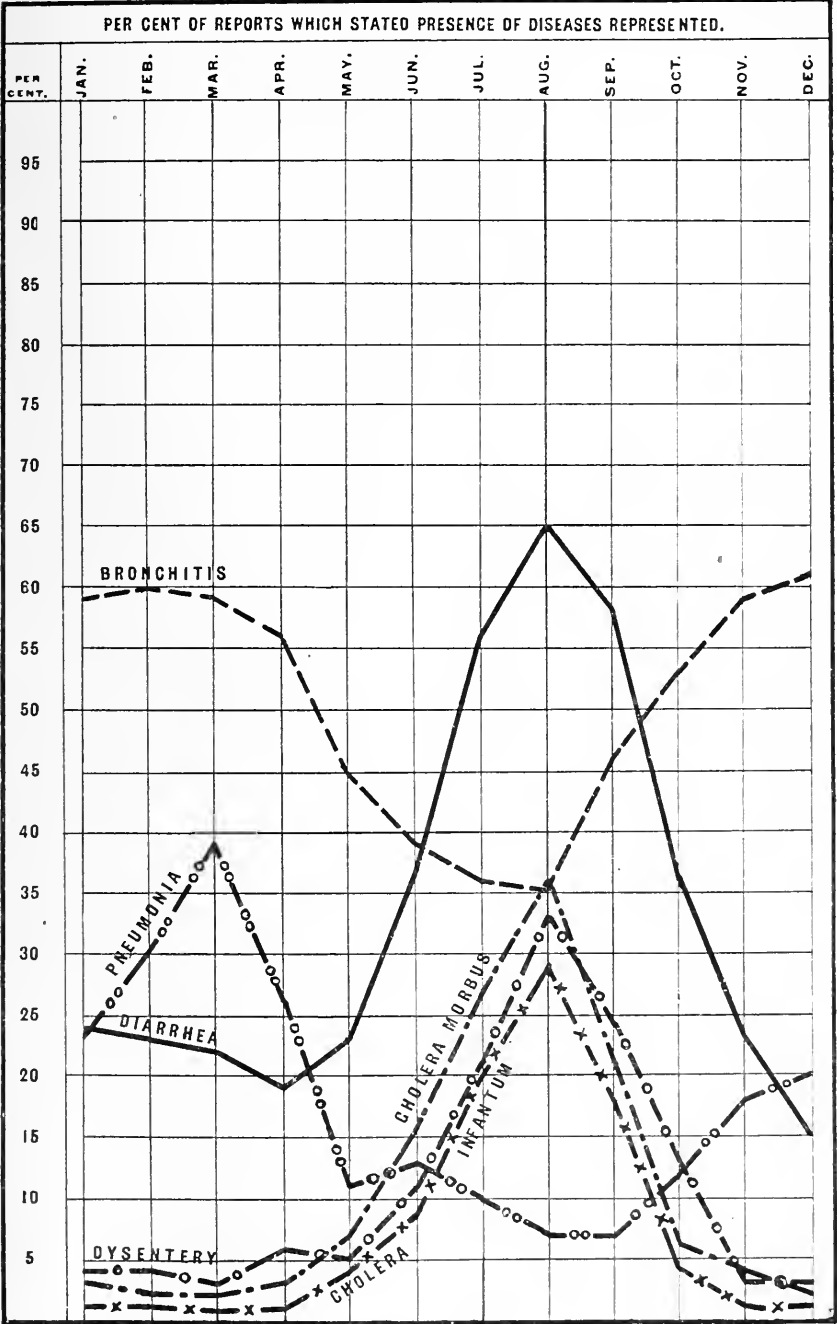


EXHIBIT III.—*Stating, by Months of the Year ending Saturday, January 2, 1897, for the State, and for each of the Eleven Geographical Divisions of Michigan from which Weekly Reports of Diseases were received, the number of Observers from whom the reports were received; the number of reports received; the day on which, for the purposes of this compilation, each month is made to end; and the number of Weeks thus included in each Month.*

Months, 1896.	Months and Year end Saturday.	Number of Weeks.	State.		1. Up-Pen- insular.*		2. North- western.*		3. North- ern.*		4. North- eastern.*		5. Western.*		6. Northern- Central.*		7. Bay and Eastern.*		8. Central.*		9. South- western.*		10. Southern- Central.*		11. South- eastern.*			
			Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†	Observers.†	Reports.†
			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Year, 1896†	Jan. 2, 1897	53	144	3,940	29	104	49	203	55	211	32	128	93	373	27	108	95	396	298	970	86	335	195	778	82	334		
Av. per month		...	82	328	2	9	4	17	5	18	3	11	8	31	2	9	8	33	20	81	7	28	16	65	7	28		
January	February 1	5	78	370	3	15	2	10	4	17	1	5	6	27	5	25	8	38	20	97	7	27	15	74	7	35		
February	February 29	4	83	305	3	10	3	11	5	18	2	8	5	18	5	18	8	29	21	79	8	30	16	58	7	26		
March	March 28	4	83	298	3	8	4	15	4	16	2	7	7	28	4	12	8	29	22	81	8	28	14	48	7	26		
April	May 2	5	63	277	3	13	3	13	2	8	2	9	5	25	2	8	7	32	19	83	6	24	8	38	6	24		
May	May 30	4	81	298	3	9	4	16	4	13	2	8	7	25	3	10	7	26	20	75	8	31	16	58	7	27		
June	June 27	4	87	313	4	11	5	16	5	18	2	8	7	24	2	8	7	26	20	72	9	33	19	70	7	27		
July	August 1	5	80	374	1	5	5	25	5	22	3	13	7	34	1	5	7	35	20	95	8	40	16	69	7	31		
August	August 29	4	83	300	2	6	5	18	5	17	2	7	9	32	1	4	8	30	20	71	7	25	17	64	7	26		
September	October 3	5	81	377	1	5	4	20	4	20	3	12	9	42	1	5	9	44	19	90	5	24	19	83	7	32		
October	October 31	4	89	326	1	4	4	16	6	19	5	18	12	45	1	4	9	34	20	74	7	22	18	66	6	24		
November	November 28	4	88	312	2	5	5	20	4	12	4	14	11	36	1	4	9	34	19	69	6	21	20	70	7	27		
December	January 2	5	86	380	3	13	5	23	7	31	4	19	8	37	1	5	8	39	18	84	7	30	18	80	7	29		

* The counties in each division are given in Exhibit I. † From some of the observers reports were not received every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks in the given month or in the year.
† In some localities there were more observers than one. The whole number of localities from which reports were received was 128; the average number per month was 81. The names of observers and number of cards received from each observer for each month and for the year are stated in Exhibit V.

EXHIBIT IV.—*Stating for each of 23 Diseases, the average for the period of nineteen years, 1877-95, and for each of the last twelve of those years and for 1896; also for the period of ten years, 1886-95, on what Per Cent of the Reports received the Diseases were stated to be present. Compiled from Weekly Reports by Health Officers of Cities and Villages and by regular correspondents of the State Board of Health.* Continued for each month of 1895 and 1896 on pages following this.*

Line Number.	Diseases.	What Per Cent of the Reports stated the Presence of the Disease.														
		Av. 1877-95.	Av. 1886-95.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
	Average Disease†...	26	23	18	20	20	20	21	25	25	23	24	25	26	26	29
1	Rheumatism.....	67	66	60	60	62	64	64	69	71	65	66	69	70	68	70
2	Neuralgia†.....	64	62	54	56	56	57	61	66	67	63	62	67	67	68	70
3	Bronchitis.....	59	56	51	52	50	53	54	60	65	58	59	55	56	56	61
4	Tonsillitis†.....	47	46	45	43	42	49	48	49	50	46	41	47	49	50	50
5	Influenza.....	41	41	44	44	41	43	42	55	53	32	32	33	35	34	41
6	Diarrhea.....	45	44	34	42	40	40	43	47	44	45	41	48	45	46	52
7	Consumption, pul.†.	54	45	23	29	36	38	38	49	52	48	49	51	55	58	63
8	Intermittent fever..	54	36	19	22	24	24	27	36	41	43	45	48	54	59	65
9	Pneumonia.....	31	26	18	21	20	22	25	27	30	26	30	28	27	27	29
10	Remittent fever....	37	26	16	20	20	18	21	28	27	30	34	32	34	36	44
11	Inflam. of kidney†..	20	19	16	20	17	17	21	20	21	20	19	18	20	21	26
12	Pleuritis†.....	-----	17	16	17	13	14	18	21	19	17	15	-----	-----	-----	-----
13	Erysipelas.....	21	19	12	13	13	14	16	19	21	22	24	24	23	24	26
14	Cholera morbus.....	17	15	11	15	14	14	15	16	15	14	15	19	17	17	22
15	Dysentery.....	18	16	11	15	14	13	15	16	16	17	17	19	17	15	23
16	Inflam. of bowels†..	14	14	10	11	13	12	13	15	14	14	14	16	17	17	17
17	Typhoid fever (ent.)	11	10	10	13	11	9	9	11	8	10	10	10	8	8	12
18	Cholera infantum..	12	12	8	12	12	10	11	13	10	11	11	13	14	17	15
19	Scarlet fever.....	14	11	8	12	14	10	12	9	10	10	9	8	11	12	16
20	Measles.....	11	9	7	4	6	7	4	10	12	6	16	14	6	5	10
21	Whooping-cough....	16	12	7	9	12	9	10	9	9	16	9	14	20	14	23
22	Diphtheria.....	15	8	5	5	7	7	7	6	8	6	7	10	13	14	15
23	Small-pox.....	0.7	0.2	4	0.3	0.6	0.3	.02	0	0.1	.03	.03	.02	0.4	0.2	0.1
24	Inflam. of brain†....	5	4	3	3	3	3	3	4	5	5	5	6	5	6	7
25	Typho-mal. fever†..	16	9	2	4	4	4	5	6	7	16	15	16	16	16	20
26	Puerperal fever....	4	4	2	2	2	3	4	3	4	5	4	6	5	6	7
27	Cerebro-spi. men...	4	2	1	0.8	1	2	2	3	3	3	3	3	4	6	7
28	Membranous croup..	5	3	1	2	2	2	3	4	4	3	4	4	5	5	6
No. of reports received..		\$4,578	\$5,086	3,940	4,395	5,572	5,853	5,281	4,291	4,939	5,000	5,047	4,896	5,583	5,108	3,957

* For 1896 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III., the names of the observers and the number of the reports received from each are stated in Exhibit V.

† The numbers opposite the names of the diseases do not state what per cent of the whole number of reports for the year stated the disease to be present at some time during the year, but state (on an average for twelve months of the year), what per cent of reports for the several months stated the disease to be present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the reports for that month (the number of which is stated at the foot of the column) stated the given disease to be present in that month. [† For foot-note see page 105.] \$ Average per year.

EXHIBIT IV.—CONTINUED.—*Stating for each of 23 Diseases by months, on what Per 1895 and 1896; also the Average by Months for the Period of ten*

What Per Cent of the Reports Received Stated Presence of the Disease.†																								
Line number.	January.*					February.*					March.*													
	Diseases.				Average Disease†	Diseases.				Average Disease†	D'seases.				Average Disease†									
	Av. '77-'95.	Av. '86-'95.	1896.	1895.		Av. '77-'95.	Av. '86-'95.	1896.	1895.		Av. '77-'95.	Av. '86-'95.	1896.	1895.										
	Average Disease†	27	24	19	20	Average Disease†	27	24	19	21	Average Disease†	28	25	20	22									
1	Neuralgia	67	66	65	58	Influenza	65	68	78	74	Influenza	63	66	79	84									
2	Rheumatism	71	69	62	60	Rheumatism	71	69	63	64	Neuralgia	71	70	64	69									
3	Influenza	62	66	60	67	Neuralgia	69	68	62	63	Rheumatism	73	72	62	69									
4	Bronchitis	73	69	59	66	Bronchitis	74	70	60	71	Bronchitis	73	70	59	70									
5	Tonsillitis	58	57	57	54	Tonsillitis	59	57	52	54	Tonsillitis	59	58	49	55									
6	Diarrhea	23	27	24	23	Pneumonia	55	47	30	42	Pneumonia	52	44	39	45									
7	Pneumonia	55	45	23	39	Consumption, pul.	56	46	24	31	Pleuritis	56	45	25	27									
8	Consumption, pul.	55	47	29	33	Inflam. of kidney.	52	21	24	25	Consumption, pul.	58	48	22	33									
9	Inflam. of kidney.	21	20	23	17	Diarrhea	27	27	23	28	Diarrhea	29	29	22	29									
10	Remittent fever	31	23	21	17	Pleuritis	24	25	21	22	Inflam. of kidney.	23	22	18	24									
11	Pleuritis	25	20	20	25	Erysipelas	24	22	15	11	Erysipelas	25	22	15	11									
12	Scarlet fever	18	13	16	18	Remittent fever	30	22	15	15	Scarlet fever	31	22	15	15									
13	Erysipelas	24	21	14	8	Intermittent fever	45	30	13	13	Intermittent fever	48	32	13	16									
14	Intermittent fever	44	30	14	17	Typhoid fev. (ent.)	7	5	10	5	Inflam. of bowels.	13	13	12	9									
15	Typhoid fev. (ent.)	9	7	10	8	Scarlet fever	18	11	10	10	Measles	15	13	11	5									
16	Whooping-cough	15	10	8	15	Whooping-cough	15	11	9	11	Scarlet fever	18	12	11	14									
17	Inflam. of bowels.	12	12	7	6	Inflam. of bowels	12	12	7	10	Whooping-cough	15	11	9	9									
18	Diphtheria	19	10	5	10	Measles	12	11	7	4	Dysentery	7	6	3	4									
19	Dysentery	7	6	4	5	Inflam. of brain.	5	5	5	4	Typhoid fev. (ent.)	5	4	3	5									
20	Cholera morbus	4	3	3	5	Diphtheria	16	8	5	6	Small-pox	0.6	0.3	3	1									
21	Inflam. of brain	5	4	2	2	Dysentery	6	6	4	7	Inflam. of brain.	5	5	2	3									
22	Membran. croup	9	6	3	2	Cholera morbus	4	3	2	6	Cholera morbus	5	3	2	3									
23	Measles	9	7	3	3	Puerperal fever	5	4	2	4	Diphtheria	14	7	2	5									
24	Puerperal fever	5	5	3	2	Small-pox	0.9	0.6	2	1	Cerebro-spi. men.	4	3	1	2									
25	Cholera infantum	13	6	0	1	Cerebro-spi. men.	4	3	1	1	Puerperal fever	5	4	1	2									
26	Typho-mal fever	13	6	0	2	Cholera infantum	1	1	1	1	Typho-mal fever	9	5	0	2									
27	Cerebro-spi. men.	5	3	0	5	Membran. croup	7	5	0	7	Cholera infantum	1	0	7	1									
28	Small-pox	1.1	0.5	0	1	Typho-mal fever	10	5	0.3	3	Membran. croup	6	4	0.3	2									
		Reports received	332	416	370	452			Reports received	349	389	305	367			Reports received	368	405	298	341				
Line number.	April.*					May.*					June.*													
	Diseases.				Average Disease†	Diseases.				Average Disease†	Diseases.				Average Disease†									
	Av. '77-'95.	Av. '86-'95.	1896.	1895.		Av. '77-'95.	Av. '86-'95.	1896.	1895.		Av. '77-'95.	Av. '86-'95.	1896.	1895.										
	Average Disease†	27	24	17	22	Average Disease†	25	23	16	19	Average Disease†	24	21	16	18									
1	Rheumatism	74	73	67	69	Rheumatism	71	71	61	66	Rheumatism	67	66	55	58									
2	Neuralgia	70	69	57	65	Neuralgia	65	64	50	63	Neuralgia	62	60	50	57									
3	Bronchitis	69	67	56	66	Bronchitis	60	58	45	56	Bronchitis	51	48	49	47									
4	Influenza	55	58	55	80	Tonsillitis	47	47	37	45	Diarrhea	42	40	37	44									
5	Tonsillitis	54	54	46	55	Influenza	40	41	30	50	Tonsillitis	39	38	32	38									
6	Pneumonia	46	38	26	35	Consumption, pul.	56	47	26	29	Consumption, pul.	54	44	24	30									
7	Consumption, pul.	59	50	21	34	Diarrhea	34	32	23	30	Intermittent fever	59	38	23	27									
8	Intermittent fever	54	37	21	19	Intermittent fever	58	37	23	22	Influenza	27	26	22	27									
9	Diarrhea	31	30	19	33	Inflam. of kidney	24	23	17	24	Cholera morbus	16	15	16	17									
10	Inflam. of kidney	24	24	19	21	Measles	22	18	17	7	Remittent fever	37	25	15	23									
11	Pleuritis	24	22	19	19	Pleuritis	22	18	16	16	Pleuritis	21	14	15	14									
12	Erysipelas	26	24	13	19	Remittent fever	35	24	14	18	Inflam. of kidney	21	21	14	20									
13	Remittent fever	34	24	10	13	Erysipelas	24	22	13	17	Measles	18	15	14	8									
14	Measles	19	16	10	6	Pneumonia	34	28	11	19	Erysipelas	22	20	13	19									
15	Inflam. of bowels.	12	12	9	13	Inflam. of bowels.	13	13	10	10	Pneumonia	20	15	13	8									
16	Scarlet fever	18	13	9	16	Cholera morbus	7	7	7	7	Inflam. of bowels	15	14	12	11									
17	Whooping-cough	15	12	8	9	Whooping-cough	16	13	7	8	Dysentery	12	10	11	9									
18	Dysentery	7	6	6	5	Dysentery	8	7	5	5	Whooping-cough	16	12	11	9									
19	Inflam. of brain	6	5	3	3	Scarlet fever	16	12	5	13	Cholera infantum	9	9	4	13									
20	Cholera morbus	5	4	3	4	Inflam. of brain	5	5	4	3	Typhoid fev. (ent.)	5	4	6	3									
21	Typhoid fev. (ent.)	5	4	3	8	Cholera infantum	3	3	4	5	Scarlet fever	14	10	5	11									
22	Puerperal fever	5	5	3	3	Puerperal fever	5	4	4	2	Inflam. of brain	5	5	3	3									
23	Cholera infantum	12	12	1	2	Diphtheria	12	6	3	1	Diphtheria	11	6	3	4									
24	Diphtheria	14	7	1	4	Typhoid fev. (ent.)	5	4	3	3	Cerebro-spi. men.	3	2	2	0									
25	Small-pox	0.9	0.2	1	0	Cerebro-spi. men.	4	3	1	1	Puerperal fever	5	4	2	3									
26	Typho-mal fever	9	6	0	4	Membran. croup	4	3	1	1	Typho-mal fever	8	5	0	6									
27	Cerebro-spi. men.	5	3	0	5	Typho-mal fever	8	5	1	1	Membran. croup	3	2	0	1									
28	Membran. croup	5	4	0	0	Small-pox	1.3	0.2	0	0	Small-pox	1.1	0.3	0	0									
		Reports received	322	345	277	267			Reports received	375	418	298	341			Reports received	370	417	313	341				

*, †, ‡. These notes on the preceding page.

§ The numbers in this line

Cent of the Reports Received the Diseases were stated to be Present in each of the years years, 1836-95, and for the Period of nineteen years, 1877-95.

What Per Cent of the Reports Received Stated Presence of the Disease.†																
July.*					August.*					September.*					Line number.	
Diseases.	Av. 77-95.	Av. 86-95.	1896.	1895.	Diseases.	Av. 77-95.	Av. 86-95.	1896.	1895.	Diseases.	Av. 77-95.	Av. 86-95.	1896.	1895.		
Average Disease†.	26	22	17	19	Average Disease†.	28	24	18	20	Average Disease†.	29	24	18	19		
Diarrhea.....	68	64	56	64	Diarrhea.....	82	79	65	73	Diarrhea.....	77	75	58	71	1	
Rheumatism.....	61	60	54	53	Rheumatism.....	57	58	52	53	Rheumatism.....	60	60	54	53	2	
Neuralgia.....	58	57	44	51	Neuralgia.....	56	55	43	49	Bronchitis.....	46	45	46	35	3	
Bronchitis.....	42	40	36	34	Cholera morbus.....	52	48	36	37	Neuralgia.....	57	56	45	45	4	
Tonsillitis.....	33	33	33	32	Bronchitis.....	40	39	35	34	Tonsillitis.....	35	34	40	26	5	
Cholera morbus.....	41	35	27	30	Dysentery.....	49	43	33	42	Influenza.....	26	24	27	14	6	
Intermittent fever.....	61	41	24	30	Tonsillitis.....	32	31	30	31	Consumption, pul.....	52	42	25	25	7	
Consumption, pul.....	52	43	22	29	Cholera infantum.....	44	40	29	37	Dysentery.....	45	41	24	38	8	
Dysentery.....	27	22	21	27	Consumption, pul.....	51	42	25	28	Typhoid fev. (ent.).....	20	19	24	23	9	
Cholera infantum.....	28	25	20	27	Intermittent fever.....	62	43	23	27	Intermittent fever.....	61	41	23	26	10	
Influenza.....	19	17	18	19	Remittent fever.....	45	31	22	20	Cholera morbus.....	35	37	21	38	11	
Remittent fever.....	39	27	17	25	Typhoid fev. (ent.).....	14	14	16	19	Remittent fever.....	47	34	20	24	12	
Inflam. of bowels.....	16	16	13	10	Influenza.....	19	17	16	17	Cholera infantum.....	34	33	18	40	13	
Inflam. of kidney.....	18	18	13	17	Inflam. of bowels.....	20	19	15	16	Pleuritis.....	11	14	9	14		
Erysipelas.....	18	16	11	13	Erysipelas.....	17	15	11	12	Inflam. of kidney.....	16	16	13	16	15	
Pleuritis.....	11	11	11	13	Inflam. of kidney.....	17	16	11	17	Erysipelas.....	16	14	12	7	16	
Pneumonia.....	13	10	10	8	Pneumonia.....	11	8	7	5	Inflam. of bowels.....	16	17	8	16	17	
Typhoid fev. (ent.).....	7	7	9	13	Pleuritis.....	9	6	6	9	Pneumonia.....	14	11	7	4	18	
Measles.....	11	8	9	4	Scarlet fever.....	9	6	5	6	Diphtheria.....	12	7	6	4	19	
Whooping-cough.....	18	14	8	12	Typho-mal. fever.....	19	13	4	5	Scarlet fever.....	10	8	6	8	20	
Scarlet fever.....	10	7	6	5	Whooping-cough.....	18	14	4	9	Typho-mal. fever.....	29	17	5	5	21	
Inflam. of brain.....	5	4	2	3	Diphtheria.....	11	6	3	5	Whooping-cough.....	17	12	5	6	22	
Diphtheria.....	10	6	2	4	Inflam. of brain.....	5	4	2	5	Cerebro-spi. men.....	3	4	2	1	23	
Typho-mal. fever.....	11	7	2	5	Cerebro-spi. men.....	3	2	2	2	Inflam. of brain.....	5	2	1	1	24	
Cerebro-spi. men.....	3	2	1	1	Measles.....	5	4	2	2	Membran. croup.....	3	2	1	1	25	
Puerperal fever.....	4	4	1	1	Puerperal fever.....	4	3	1	1	Measles.....	4	2	1	2	26	
Membran. croup.....	2	1	0	1	Membran. croup.....	2	1	0	1	Puerperal fever.....	4	3	1	1	27	
Small-pox.....	0.9	0.2	0	0	Small-pox.....	0.4	0.2	0	0	Small-pox.....	0.3	0.1	0.0	3	28	
Reports received\$	402	445	374	452	Reports received\$	424	480	300	366	Reports received\$	395	445	377	375		
October.*					November.*					December.*					Line number.	
Diseases.	Av. 77-95.	Av. 86-95.	1896.	1895.	Diseases.	Av. 77-95.	Av. 86-95.	1896.	1895.	Diseases.	Av. 77-95.	Av. 86-95.	1896.	1895.		
Average Disease†.	27	23	17	19	Average Disease†.	26	22	17	17	Average Disease†.	26	23	17	18		
Rheumatism.....	66	65	60	60	Rheumatism.....	69	66	65	61	Rheumatism.....	71	68	63	60	1	
Neuralgia.....	61	60	56	53	Bronchitis.....	63	59	59	52	Bronchitis.....	68	63	61	52	2	
Bronchitis.....	54	53	53	44	Neuralgia.....	65	62	59	52	Influenza.....	52	55	58	50	3	
Tonsillitis.....	44	43	47	36	Tonsillitis.....	53	52	56	45	Tonsillitis.....	58	56	58	53	4	
Influenza.....	32	30	39	26	Influenza.....	41	41	49	41	Neuralgia.....	66	63	57	56	5	
Diarrhea.....	54	51	36	50	Diarrhea.....	33	31	23	21	Consumption, pul.....	52	43	21	24	6	
Consumption, pul.....	52	42	22	25	Consumption, pul.....	52	42	22	24	Pneumonia.....	38	32	20	22	7	
Intermittent fever.....	59	39	22	23	Pleuritis.....	16	18	17	17	Pleuritis.....	21	21	17	19	8	
Remittent fever.....	46	33	17	28	Pneumonia.....	25	23	18	18	Diarrhea.....	27	26	15	24	9	
Typhoid fev. (ent.).....	22	21	17	31	Intermittent fever.....	52	34	17	20	Intermittent fever.....	46	30	15	19	10	
Inflam. of kidney.....	18	17	14	18	Remittent fever.....	38	28	15	21	Inflam. of kidney.....	20	19	15	21	11	
Dysentery.....	23	22	13	25	Inflam. of kidney.....	20	19	15	21	Remittent fever.....	33	24	14	22	12	
Pneumonia.....	19	15	12	9	Diphtheria.....	20	10	12	6	Erysipelas.....	22	21	13	21	13	
Pleuritis.....	13	11	11	11	Typhoid fev. (ent.).....	19	17	11	24	Scarlet fever.....	15	12	12	13	14	
Inflam. of bowels.....	14	14	10	13	Erysipelas.....	20	18	9	12	Inflam. of bowels.....	13	12	10	8	15	
Diphtheria.....	18	10	10	6	Inflam. of bowels.....	13	12	7	10	Diphtheria.....	19	10	9	5	16	
Erysipelas.....	19	16	10	10	Scarlet fever.....	15	12	6	16	Inflam. of brain.....	4	4	4	2	17	
Cholera morbus.....	14	13	6	14	Cholera morbus.....	6	5	4	4	Typhoid fev. (ent.).....	13	11	4	14	18	
Typho-mal. fever.....	31	18	6	10	Inflam. of brain.....	4	4	3	2	Measles.....	6	5	4	3	19	
Whooping-cough.....	14	10	5	4	Dysentery.....	10	9	3	6	Dysentery.....	6	6	3	2	20	
Cholera infantum.....	12	14	4	13	Measles.....	5	3	3	2	Cerebro-spi. men.....	3	4	2	0.3	21	
Puerperal fever.....	4	3	3	2	Cerebro-spi. men.....	2	2	2	2	Cholera morbus.....	4	4	2	4	22	
Scarlet fever.....	14	11	3	13	Membran. croup.....	1	5	2	4	Membran. croup.....	7	5	5	23	23	
Measles.....	4	3	2	0.2	Typho-mal. fever.....	22	12	2	4	Puerperal fever.....	4	4	4	24	24	
Cerebro-spi. men.....	3	2	1	0.5	Whooping-cough.....	15	10	2	5	Whooping-cough.....	15	10	1	25	25	
Membran. croup.....	4	3	1	0.7	Cholera infantum.....	3	3	1	1	Cholera infantum.....	2	2	1	0	26	
Infl. m. of brain.....	4	4	0.3	4	Puerperal fever.....	4	3	0.3	3	Typho-mal. fever.....	15	8	1	1	27	
Small-pox.....	0.3	0.2	0	0.5	Small-pox.....	0.5	0.2	0	0	Small-pox.....	0.5	0.2	0	0	28	
Reports received\$	413	460	326	432	Reports received\$	391	444	312	335	Reports received\$	388	421	380	322		

state how many reports received for the month in the given years.

EXHIBIT V.—By months and by Geographical Divisions of the State,* the Names of 144 Observers, whose Weekly Reports of Diseases for 1896 are Compiled in Tables 1, 2, 3 and 4, the Localities^a for which they Report, and the Number of Reports Received from each Observer.

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1896.—Compiled in this Article.												
	Year, 1896.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All localities.....	3,940	370	305	298	277	298	313	374	300	377	326	312	390
Upper Peninsular Division.....*	104	15	10	8	13	9	11	5	6	5	4	5	13
Gladstone, Chas. A. Chase, M. D.	18	5	4	4	5								
Houghton, H. W. Jones, M. D.	7					3	4						
Laurium, D. K. McQueen, M. D.	28						2	5	4	5	4	8	5
Richmond Tp. (Marquette Co.), H. M. Haskell, M. D.	12	5	2	2	3								
Rockland Tp., W. C. Gates, M. D.	30	5	4	2	5	3	2		2			2	5
Sault Ste. Marie, H. R. Floyd, M. D.	9					3	3						3
Northwestern Division.....*	203	10	11	15	13	16	16	25	18	20	16	20	23
Cadillac, David Ralston, M. D.	23		3	3			2	5	2			4	4
Fife Lake, Lewis S. Walter, M. D.	51	5	4	4	5	4	2	5	4	5	4	4	5
Manistee, J. Kinsley, M. D.	16	5	4	4	3								
Manistee, Jas. A. King, M. D.	35					4	4	5	4	5	4	4	5
Manton, V. F. Huntley, M. D.	44			4	5	4	4	5	4	5	4	4	5
Traverse City, J. B. Martin, M. D.	34					4	4	5	4	5	4	4	4
Northern Division.....*	211	17	18	16	8	13	18	22	17	20	19	12	31
Bellaire, A. T. Bodle, M. D.	12	4	4	4									
Boardman, S. E. Neihardt, M. D.	29						2	5	4	5	4	4	5
Boyne City, A. J. DeLacy, M. D.	48	5	4	4	5	4	4	5	4	5	3	5	5
Cheboygan, S. A. St. Amour, M. D.	22								4	5	4	4	5
East Jordan, Frank A. Foster, M. D.	13	5	4	4									
East Jordan, F. C. Warne, M. D.	10							3			2		5
Kalkaska, R. S. Trask, M. D.	7		4		3								
Kalkaska, P. W. Pearsall, M. D.	16					4	4	3				2	3
Mancelona, Chas. Beaver, M. D.	30					3	4	5	2	5	4	2	5
Petoskey, J. J. Reyerft, M. D.	11	3	2	4							2		
Petoskey, J. E. Rankin, M. D.	13					2	4	4					3
Northeastern Division.....*	128	5	8	7	9	8	8	13	7	12	18	14	19
Alpena, A. M. Miller, M. D.	14							3			4	2	5
Atlanta, Geo. W. DeClement, M. D.	7									4	3		
Harrisville, D. W. Mitchell, M. D.	53	5	4	4	5	4	4	5	4	5	4	4	5
Rogers City, Edwin Erskine, Jr., M. D.	7		4	3									
Rogers City, C. W. Isaminger, M. D.	35				4	4	4	5	3	3	4	4	4
Tawas City, Geo. S. Darling, M. D.	12										3	4	5
Northern Central Division.....*	108	25	18	12	8	10	8	5	4	5	4	4	5
Big Rapids, E. A. Romig, M. D.	11	5	4	2									
Big Rapids, W. A. Whitney, M. D.	34					3	4	5	4	5	4	4	5
Clare, P. E. Witherspoon, M. D.	9	5	4										
Coleman, C. V. High, M. D.	7					3	4						
LeRoy, U. S. Barr, M. D.	20	5	3	4	4	4							
McBain, Francis Wright, M. D.	17	5	4	4	4								
Roscommon, J. A. Fraser, M. D.	10	5	3	2									
Western Division.....*	373	27	18	28	25	25	24	34	32	42	45	36	37
Cannonsburg, C. R. Crosby, M. D.	44	4		4	5	4	4	5	3	5	2	3	5
Custer, Austin D. Kibbie, M. D.	15								4			4	3
Fremont, Van N. Miller, M. D.	21	4	4	4		2	2				3	2	
Grand Haven, Wm. F. Reus, M. D.	33	5	3	4	5	4	3	4	3			2	
Grand Rapids, A. Hazlewood, M. D.	50	4	3	4	5	4	4	5	4	5	4	3	5
Grandville, John D. Buskirk, M. D.	17									4	4	4	5
Holland, Henry Kremers, M. D.	8										4	4	
Lisbon, K. Greiner, M. D.	9								2	3	4		
Ludington, E. N. Dundas, M. D.	53	5	4	4	5	4	4	5	4	5	4	4	5
Luther, Earl Fairbanks, M. D.	13	5	4	4									
Muskegon, Geo. S. Williams, M. D.	35					4	4	5	4	5	4	4	5
Pentwater, J. D. Campbell, M. D.	25							5	4	5	4	2	5
Sand Lake, C. J. Annes, M. D.	33			4	5	3	3	5	4	5	4		
Whitehall, John Busby, M. D.	17									5	4	4	4

^a In many cases the reports include sickness in the vicinity as well as in the corporate limits of the places named.

* For counties in each division see Exhibit I.

EXHIBIT V.—CONTINUED.

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1896.—Compiled in this Article.												
	Year, 1896.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Central Division.....*	970	97	79	81	83	75	72	95	71	90	74	69	84
Alma, J. F. Suydam, M. D.	45	---	2	4	5	4	4	5	4	5	4	4	4
Bancroft, Geo. Cosgrove, M. D.	16	---	---	---	---	---	3	5	4	---	---	---	---
Belding, I. S. Morris, M. D.	34	5	4	4	---	4	4	4	4	5	---	---	---
Bellevue, A. S. Wilson, M. D.	36	---	---	4	5	4	4	5	3	5	3	3	---
Brighton, H. M. Ptolmey, M. D.	34	5	4	3	4	3	3	5	2	---	2	---	4
Charlotte, E. C. Palmer, M. D.	15	---	4	3	3	---	---	---	---	---	---	---	---
Elsie, James H. Travis, M. D.	16	---	4	4	3	---	---	---	---	---	---	---	---
Flint, Noah Bates, M. D.	53	5	4	4	5	4	4	5	4	5	4	4	5
Flushing, Chas. S. Wheeler, M. D.	35	---	---	---	---	4	4	5	4	4	4	4	5
Gaines, G. H. Abway, M. D.	52	5	4	4	5	4	4	5	3	5	4	4	5
Hamburg Tp., J. N. Swartz, M. D.	53	5	4	4	---	4	4	5	4	5	4	4	5
Hastings, Clarence H. Baker, M. D.	16	5	4	4	3	---	---	---	---	---	---	---	---
Hastings, G. W. Lowry, M. D.	34	---	---	---	---	4	4	5	3	5	4	4	5
Howard City, James Totten, M. D.	25	5	4	4	5	4	3	---	---	---	---	---	---
Ionia, Henry Tremayne, M. D.	13	5	4	4	---	---	---	---	---	---	---	---	---
Lakeview, F. R. Blanchard, M. D.	49	5	4	2	5	4	3	5	4	4	4	4	5
Lansing, A. D. Hagadorn, M. D.	33	---	---	---	---	3	4	4	4	5	4	4	5
Linden, M. E. Topping, M. D.	45	5	4	3	5	4	4	5	4	5	4	2	---
Maple Rapids, A. O. Hart, M. D.	22	3	3	4	3	2	---	2	---	---	3	2	---
Mason, Chas. G. Jenkins, M. D.	16	---	---	---	---	---	---	---	4	4	3	5	---
McBrides, D. C. Bell, M. D.	53	5	4	4	5	4	4	5	4	5	4	4	5
Middleville, Geo. W. Matteson, M. D.	53	5	4	4	5	4	4	5	4	5	4	4	5
Nashville, W. H. Young, M. D.	43	5	4	4	5	4	---	3	---	5	4	4	5
Perry, H. W. Cobb, M. D.	13	5	4	4	---	---	---	---	---	---	---	---	---
Perry, H. P. Halstead, M. D.	24	---	---	---	---	3	2	4	4	3	2	3	3
Pottsville, E. R. Espie, M. D.	38	4	---	4	4	---	5	5	2	4	4	4	5
Stanton, W. P. Gamber, M. D.	52	5	4	3	5	4	4	5	4	5	4	4	5
Vermontville, Chas. S. Snell, M. D.	14	---	2	---	---	---	---	---	---	---	4	4	4
Vernon, W. H. Holtzman, M. D.	16	5	4	4	3	---	---	---	---	---	---	---	---
Vernon, T. B. Scott, M. D.	22	---	---	---	---	4	4	5	4	5	---	---	---
Bay and Eastern Division.....*	396	38	29	29	32	26	26	35	30	41	34	34	39
Cass City, N. McClinton, M. D.	12	5	3	4	---	---	---	---	---	---	---	---	---
Chesaning, D. W. Mudge, M. D.	13	---	---	---	---	---	---	---	---	---	4	4	5
Croswell, T. S. Kingston, M. D.	53	5	4	4	5	4	4	5	4	5	4	4	5
Deckerville, Geo. C. Vincent, M. D.	6	---	3	3	---	---	---	---	---	---	---	---	---
Deckerville, H. F. Alderton, M. D.	40	---	---	---	5	4	4	5	4	5	4	4	5
Emmet, A. J. Abbott, M. D.	19	---	---	---	---	---	---	2	4	4	4	4	5
Mayville, Beni. D'Arcy, M. D.	25	5	3	---	4	---	---	---	5	4	4	4	---
Mariue City, F. Blagborne, M. D.	43	4	---	2	5	2	4	5	4	5	4	4	4
Marlette, F. E. Wilson, M. D.	34	---	---	---	---	4	4	5	4	5	4	3	5
Metamora, G. W. Stone, M. D.	13	5	4	4	---	---	---	---	---	---	---	---	---
Saginaw (W. S.), E. E. Curtis, M. D.	17	5	4	4	4	---	---	---	---	---	---	---	---
Thorntown, J. S. Caulkins, M. D.	50	4	4	4	5	4	4	5	4	5	3	3	5
Unionville, W. C. Wright, M. D.	37	5	4	4	4	4	2	5	4	5	---	---	---
West Bay City, F. L. Tupper, M. D.	34	---	---	---	---	4	4	5	4	5	3	4	5
Southwestern Division.....*	335	27	30	28	24	31	33	40	25	24	22	21	30
Benton Harbor, H. V. Tutton, M. D.	22	---	---	---	---	---	4	4	5	---	2	3	4
Berrien Springs, W. F. Mason, M. D.	8	3	3	2	---	---	---	---	---	---	---	---	---
Berrien Springs, Wm. F. Bullard, M. D.	30	---	---	---	---	4	4	5	4	4	---	4	5
Bloomington, W. J. Bruce, M. D.	20	---	---	---	---	4	4	5	4	---	3	---	---
Fennville, W. H. Andrews, M. D.	24	3	4	3	3	3	3	---	---	---	2	---	3
Hartford, H. C. Maynard, M. D.	53	5	4	4	5	4	4	5	4	5	4	4	5
Marcellus, Fred Shellito, M. D.	34	3	4	4	---	---	2	5	2	5	3	2	4
Paw Paw, Wilbur F. Hoult, M. D.	9	3	3	3	---	---	---	---	---	---	---	---	---
Paw Paw, Chas. A. Critchlow, M. D.	20	---	---	---	3	4	4	5	4	---	---	---	---
Saugatuck, H. H. Stinson, M. D.	47	---	4	4	5	4	4	5	4	5	4	4	4
South Haven, M. E. Bishop, M. D.	16	5	4	4	3	---	---	---	---	---	---	---	---
Watervliet, W. L. Garratt, M. D.	52	5	4	4	5	4	4	5	3	5	4	4	5
Southern Central Division.....*	778	74	58	48	38	58	70	69	64	83	66	70	80
Augusta, Chas. E. Doyle, M. D.	34	---	---	---	5	4	3	3	4	---	---	---	4
Blissfield, J. M. Barnes, M. D.	8	5	3	---	---	---	---	---	---	---	---	---	---
Bronson, J. E. Outwater, M. D.	13	5	4	4	---	---	---	---	---	---	---	---	---
Burr Oak, C. D. Parsons, M. D.	48	5	4	4	5	4	4	5	4	5	4	4	5
Burr Oak Tp., J. C. Kollman, M. D.	53	5	4	4	5	4	4	5	4	5	3	3	4
Clayton, E. J. C. Ellis, M. D.	46	4	3	3	5	4	4	4	4	5	3	3	4
Clinton, John L. Tuttle, M. D.	33	5	3	---	---	3	4	---	4	4	4	2	4

* For counties in each division see Exhibit I.

EXHIBIT V.—CONCLUDED.

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1896.—Compiled in this Article.												
	Year, 1896.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Southern Central Division.—Con.													
Concord, <i>W. N. Keeler, M. D.</i>	32	---	---	---	---	2	4	4	4	5	4	4	5
Constantine, <i>D. E. Thomas, M. D.</i>	33	---	---	---	---	2	4	5	4	5	4	4	5
Deerfield, <i>Webster Bliss, M. D.</i>	13	5	4	4	---	---	---	---	---	---	---	---	---
Galesburg, <i>W. L. McBeth, M. D.</i>	24	5	4	3	---	---	2	---	3	---	4	3	---
Galesburg, <i>O. F. Burroughs, M. D.</i>	29	---	---	---	---	4	4	4	3	5	2	2	5
Hudson, <i>Geo. W. Rice, M. D.</i>	17	---	---	---	---	---	---	---	---	4	4	4	5
Kalamazoo, <i>A. Hockstein, M. D.</i>	13	5	4	4	---	---	---	---	---	---	---	---	---
Kalamazoo, <i>A. M. Rockwell, M. D.</i>	27	---	---	---	---	4	4	3	2	3	3	4	4
Litchfield, <i>Amos Atkinson, M. D.</i>	53	5	4	4	5	4	4	5	4	5	4	4	5
Manchester, <i>C. F. Kapp, M. D.</i>	35	---	---	---	---	4	4	5	4	5	4	4	5
Marshall, <i>E. J. Marshall, M. D.</i>	53	5	4	4	5	4	4	5	4	5	4	4	5
Springport, <i>M. S. Pasco, M. D.</i>	12	5	4	3	---	---	---	---	---	---	---	---	---
Sturgis, <i>S. B. Follett, M. D.</i>	25	---	---	---	---	3	4	4	4	4	---	3	3
Tecumseh, <i>J. F. Jenkins, M. D.</i>	52	5	4	3	5	4	4	5	4	5	4	4	5
Tecumseh, <i>F. O. Tefft, M. D.</i>	21	5	3	2	---	---	3	3	---	---	3	2	---
Three Rivers, <i>Wm. M. Ikeler, M. D.</i>	11	---	---	---	---	---	---	---	---	3	---	4	4
Union City, <i>S. B. Frankhauser, M. D.</i>	15	---	2	2	3	---	2	---	---	3	---	---	3
Vicksburg, <i>Frank S. Colter, M. D.</i>	13	5	4	4	---	---	---	---	---	---	---	---	---
White Pigeon, <i>W. C. Cameron, M. D.</i>	30	---	---	---	---	4	4	4	4	4	3	3	4
Ypsilanti, <i>Clark R. Willcoxson, M. D.</i>	35	---	---	---	---	4	4	5	4	5	4	4	5
Southeastern Division.....*	334	35	26	26	24	27	27	31	26	32	24	27	29
Highland Park, <i>A. Stewart, M. D.</i>	53	5	4	4	5	4	4	5	4	5	4	4	5
Memphis, <i>D. H. Cole, M. D.</i>	34	---	---	---	---	4	4	5	4	4	4	4	5
New Haven, <i>Alex. Gunn, M. D.</i>	16	5	4	4	3	---	---	---	---	---	---	---	---
Plymouth, <i>F. N. Dewey, M. D.</i>	21	---	---	---	---	4	3	3	2	3	---	3	3
Pontiac, <i>Mason W. Gray, M. D.</i>	48	5	3	4	5	4	4	3	4	5	4	4	3
Richmond, <i>E. B. Keeler, M. D.</i>	13	5	4	4	---	---	---	---	---	---	---	---	---
Richmond, <i>Frank T. Fenton, M. D.</i>	38	---	---	---	3	4	4	5	4	5	4	4	5
Rochester, <i>Jesse E. Wilson, M. D.</i>	32	---	---	---	---	3	4	5	4	5	4	4	3
Royal Oak, <i>Edwin A. Kidder, M. D.</i>	11	5	4	2	---	---	---	---	---	---	---	---	---
Trenton, <i>Hiram Holden, M. D.</i>	15	5	3	4	3	---	---	---	---	---	---	---	---
Warren, <i>J. C. Flynn, M. D.</i>	53	5	4	4	5	4	4	5	4	5	4	4	5

* For counties in each division, see Exhibit I.

TABLE 1.—*Stating, for each of the Thirteen Years, 1884-96, and the Average for the nineteen years, 1877-95, also the Average for the ten years, 1886-95, by what Per Cent of Observers each of 28 Diseases was reported present in those years (also the Average Number of Observers per Month and the Total Observers for each Year).—Compiled from Weekly Reports of Health Officers of Cities and Villages and from Regular Correspondents of the State Board of Health.*—Diseases arranged in order of Greatest Number of Observers reporting them present in 1896.—(Continued for each month of 1895 and 1896, on following pages.)*

Line number.	Diseases.	Observers by whom the Several Diseases were Reported Present— Average Per Cents (per Month) of those making Reports.†															
		Av. 1877- 95.	Av. 1886- 95.	1896	1895	1894	1893	1892	1891	1890	1889	1888	1887	1886	1885	1884	
	Av. for tabulated dis- eases reported pres. }	38	34	21	30	30	31	33	37	37	36	35	37	37	38	42	
1	Rheumatism.....	83	82	78	78	78	80	83	86	87	82	82	82	85	83	83	
2	Neuralgia†.....	80	80	74	74	74	76	80	83	85	82	79	83	83	83	84	
3	Bronchitis.....	74	73	70	69	67	72	73	75	81	75	74	69	71	70	74	
4	Tonsillitis†.....	70	69	70	66	64	71	71	74	75	71	64	68	70	72	73	
5	Influenza.....	54	55	59	58	55	57	56	69	67	49	46	46	48	47	53	
6	Diarrhea.....	64	63	55	60	58	61	63	67	68	65	60	65	64	66	71	
7	Pneumonia.....	56	44	34	36	36	37	43	40	50	47	49	46	48	44	48	
8	Pleuritis†.....		32	32	32	28	27	35	36	35	33	32					
9	Intermittent fever.....	67	52	31	35	36	37	43	52	58	61	59	64	71	73	79	
10	Consumption, pul. †.....	63	54	29	35	43	47	49	60	62	59	57	60	64	68	72	
11	Inflam. of kidney†.....	34	34	29	33	31	29	36	36	36	35	33	32	35	34	41	
12	Remittent fever.....	51	40	27	32	31	28	34	43	40	45	49	46	48	52	60	
13	Erysipelas.....	40	37	26	28	27	29	34	39	43	43	44	44	43	44	48	
14	Inflam. of bowels†.....	29	29	23	25	27	25	28	31	29	29	30	32	32	32	30	
15	Cholera morbus.....	30	29	23	26	27	26	29	31	29	27	29	33	29	33	37	
16	Dysentery.....	31	30	23	28	27	25	29	30	31	33	30	33	30	28	38	
17	Typhoid fever (ent.)....	18	16	16	21	18	15	15	16	14	17	16	15	15	16	20	
18	Cholera infantum.....	22	22	15	22	20	18	21	23	21	21	20	24	25	21	26	
19	Scarlet fever.....	25	19	14	19	24	19	22	17	18	18	17	15	20	22	29	
20	Measles.....	18	15	12	8	11	14	7	17	22	12	25	22	10	9	17	
21	Whooping-cough.....	26	19	12	14	18	15	18	16	17	25	16	24	28	21	29	
22	Diphtheria.....	25	15	10	10	13	13	15	13	16	12	14	18	24	27	27	
23	Inflam. of brain†.....	12	11	7	8	9	8	9	11	12	13	13	15	13	14	14	
24	Typho-mal. fever†.....	25	17	6	8	8	9	10	12	14	26	25	26	27	27	32	
25	Puerperal fever.....	11	10	6	7	6	9	11	8	9	13	12	14	12	13	16	
26	Cerebro-spi. men.....	8	6	4	2	4	5	5	6	8	7	7	7	8	12	12	
27	Membranous croup.....	11	8	2	4	5	5	8	10	11	7	10	10	12	10	14	
28	Small-pox.....	1	0.3	1	0.5	1	0.3	.08	0	0.2	0.5	.07	.01	0.5	0.4	0.2	
.	No. of Observers.....	149	168	144	185	189	205	199	145	155	139	142	155	169	163	142	
	Av. No. of Observers } per month..... }	93	105	82	94	116	113	109	91	102	100	102	114	113	104	79	

* For 1896 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III.; the names of the observers and the number of the reports received from each are stated in Exhibit V.

†† Foot-notes are on page 105.

TABLE 1.—CONTINUED.—Per Cent of Observers by whom the several Diseases were reported for the period of ten years, 1886-95, and

Per Cent of Observers by whom the Diseases were Reported Present.†															
Line number.	January.*					February.*					March.*				
	Diseases.					Diseases.					Diseases.				
		Av. 77-95.	Av. 86-95.	1896.	1895.		Av. 77-95.	Av. 86-95.	1896.	1895.		Av. 77-95.	Av. 86-95.	1896.	1895.
	Average†.....	39	35	29	31	Average†.....	37	34	28	31	Average†.....	39	35	27	31
1	Tonsillitis.....	80	79	85	77	Influenza.....	75	78	89	87	Influenza.....	76	81	87	91
2	Rheumatism.....	86	85	82	78	Rheumatism.....	84	83	78	79	Rheumatism.....	85	85	80	83
3	Neuralgia.....	83	83	78	77	Neuralgia.....	84	83	77	81	Neuralgia.....	86	86	76	84
4	Bronchitis.....	84	81	77	81	Bronchitis.....	85	83	73	83	Bronchitis.....	85	83	75	81
5	Influenza.....	73	76	74	77	Tonsillitis.....	78	77	71	76	Tonsillitis.....	79	79	72	73
6	Diarrhea.....	46	47	50	39	Pneumonia.....	84	69	49	63	Pneumonia.....	81	65	61	63
7	Pneumonia.....	83	69	42	64	Diarrhea.....	45	46	39	48	Pleuritis.....	48	42	43	44
8	Inflam. of kidney.....	34	33	38	35	Inflam. of kidney.....	38	37	36	37	Diarrhea.....	48	49	36	49
9	Pleuritis.....	44	44	37	43	Pleuritis.....	42	42	36	42	Inflam. of kidney.....	39	38	27	38
10	Consumption, pul.....	64	57	31	38	Consumption, pul.....	64	55	29	35	Consumption, pul.....	66	57	25	39
11	Erysipelas.....	44	40	31	25	Erysipelas.....	43	40	28	22	Erysipelas.....	44	42	23	25
12	Remittent fever.....	44	33	29	27	Remittent fever.....	47	31	28	24	Inflam. of bowels.....	27	27	23	21
13	Scarlet fever.....	31	25	24	34	Typhoid fev. (ent.).....	11	8	18	10	Remittent fever.....	44	33	23	21
14	Inflam. of bowels.....	25	26	22	18	Intermittent fever.....	58	43	17	19	Intermittent fever.....	61	46	20	24
15	Intermittent fever.....	59	44	21	28	Inflam. of bowels.....	24	24	17	21	Scarlet fever.....	31	22	20	23
16	Typhoid fev. (ent.).....	16	12	17	13	Scarlet fever.....	28	19	16	18	Measles.....	24	22	17	12
17	Whooping-cough.....	26	17	17	23	Dysentery.....	12	12	13	12	Whooping-cough.....	25	18	14	13
18	Dysentery.....	15	15	15	11	Measles.....	19	17	13	8	Cholera morbus.....	12	9	6	7
19	Cholera morbus.....	10	9	12	12	Whooping-cough.....	24	17	13	17	Inflam. of brain.....	14	13	8	7
20	Diphtheria.....	32	19	9	18	Diphtheria.....	27	15	11	10	Diphtheria.....	25	14	5	11
21	Inflam. of brain.....	11	11	6	6	Inflam. of brain.....	13	12	10	8	Dysentery.....	15	14	5	13
22	Puerperal fever.....	12	12	6	12	Puerperal fever.....	11	11	6	10	Typhoid fev. (ent.).....	9	7	5	7
23	Cholera infantum.....	5	4	5	4	Cholera morbus.....	9	8	5	10	Puerperal fever.....	13	12	4	7
24	Measles.....	16	14	5	9	Cholera infantum.....	4	4	4	5	Small-pox.....	1	0	7	4
25	Membran. croup.....	19	13	5	6	Membran. croup.....	16	11	2	6	Cerebro-spi. men.....	9	8	4	5
26	Typho-mal. fever.....	21	12	3	5	Small-pox.....	1	0	6	2	Cholera infantum.....	4	4	2	5
27	Cerebro-spi. men.....	2	6	1	3	Cerebro-spi. men.....	8	7	1	1	Typho-mal. fever.....	16	10	2	4
28	Small-pox.....	2	0	6	0	Typho-mal. fever.....	17	10	1	6	Membran. croup.....	14	10	1	5
	Observers\$.....	89	100	78	97	Observers\$.....	90	100	83	99	Observers\$.....	88	97	83	95
Line number.	April.*					May.*					June.*				
	Diseases.					Diseases.					Diseases.				
		Av. 77-95.	Av. 86-95.	1896.	1895.		Av. 77-95.	Av. 86-95.	1896.	1895.		Av. 77-95.	Av. 86-95.	1896.	1895.
	Average†.....	38	35	27	31	Average†.....	38	35	25	31	Average†.....	36	33	26	29
1	Rheumatism.....	87	86	83	81	Rheumatism.....	86	85	79	85	Rheumatism.....	83	82	75	77
2	Influenza.....	68	71	78	90	Bronchitis.....	77	76	65	79	Neuralgia.....	78	77	70	77
3	Bronchitis.....	83	82	75	84	Neuralgia.....	82	82	62	81	Diarrhea.....	64	63	63	64
4	Neuralgia.....	85	84	75	80	Tonsillitis.....	72	72	60	65	Bronchitis.....	68	68	60	68
5	Tonsillitis.....	76	76	73	74	Influenza.....	57	59	46	76	Tonsillitis.....	63	63	54	62
6	Pneumonia.....	77	64	46	58	Diarrhea.....	55	53	42	52	Influenza.....	40	40	37	40
7	Diarrhea.....	50	50	40	54	Intermittent fever.....	70	54	37	41	Intermittent fever.....	71	54	36	43
8	Inflam. of kidney.....	39	38	35	34	Pleuritis.....	47	34	32	33	Cholera morbus.....	35	33	32	34
9	Intermittent fever.....	67	51	33	36	Consumption, pul.....	67	58	31	33	Pleuritis.....	25	25	31	30
10	Pleuritis.....	47	41	33	36	Erysipelas.....	45	43	30	36	Consumption, pul.....	62	54	30	39
11	Consumption, pul.....	67	59	30	40	Inflam. of kidney.....	40	40	28	43	Inflam. of bowels.....	29	29	28	26
12	Erysipelas.....	45	43	24	34	Remittent fever.....	49	37	25	33	Erysipelas.....	40	39	28	40
13	Inflam. of bowels.....	25	25	22	26	Measles.....	34	29	25	13	Pneumonia.....	42	31	24	19
14	Remittent fever.....	47	35	22	20	Pneumonia.....	65	51	22	41	Dysentery.....	23	21	23	19
15	Measles.....	30	26	16	9	Inflam. of bowels.....	28	19	17	27	Remittent fever.....	50	38	22	34
16	Scarlet fever.....	29	22	14	21	Cholera morbus.....	18	17	17	15	Inflam. of kidney.....	36	35	22	32
17	Whooping-cough.....	26	20	14	14	Cholera infantum.....	9	9	14	15	Measles.....	28	24	22	14
18	Dysentery.....	14	13	11	15	Dysentery.....	17	17	14	17	Whooping-cough.....	27	20	20	15
19	Cholera morbus.....	12	10	10	10	Whooping-cough.....	28	21	11	12	Cholera infantum.....	21	19	17	26
20	Inflam. of brain.....	14	12	6	8	Inflam. of brain.....	12	11	10	9	Typhoid fev. (ent.).....	10	8	11	6
21	Puerperal fever.....	11	12	6	8	Puerperal fever.....	11	11	10	9	Scarlet fever.....	23	17	10	18
22	Cholera infantum.....	4	4	3	3	Scarlet fever.....	27	22	9	27	Inflam. of brain.....	12	12	8	7
23	Diphtheria.....	24	12	3	6	Diphtheria.....	22	14	6	4	Diphtheria.....	20	12	6	7
24	Typhoid fev. (ent.).....	9	6	3	11	Typhoid fev. (ent.).....	9	7	6	8	Puerperal fever.....	11	10	6	6
25	Typho-mal. fever.....	16	12	2	0	Cerebro-spi. men.....	9	7	5	4	Cerebro-spi. men.....	7	5	5	0
26	Small-pox.....	2	0	4	2	Membran. croup.....	9	8	4	1	Typho-mal. fever.....	16	10	2	1
27	Cerebro-spi. men.....	10	6	0	4	Typho-mal. fever.....	16	11	4	3	Membran. croup.....	6	4	0	2
28	Membran. croup.....	12	10	0	11	Small-pox.....	2	0	4	0	Small-pox.....	2	0	6	0
	Observers\$.....	82	92	63	80	Observers\$.....	89	100	81	75	Observers\$.....	93	106	87	101

* , † , §. These notes on preceding page. § The numbers in this line

STATISTICAL STUDY OF SICKNESS IN MICHIGAN IN 1896. 101

Reported Present by Months in each of the years 1895-96, and the Average by Months for the Period of Nineteen years, 1877-95.

Per Cent of Observers by whom the Diseases were Reported Present.†												
July.*				August.*				September.*				Line number.
Diseases.	Av 77-95.	Av 86-95.	1896.	Diseases.	Av 77-95.	Av 86-95.	1896.	Diseases.	Av 77-95.	Av 86-95.	1896.	
Average†	39	35	31	Average†	41	38	29	Average†	41	37	33	
Diarrhea	88	85	79	Diarrhea	94	92	88	Diarrhea	92	85	83	1
Rheumatism	79	80	74	Rheumatism	75	76	71	Rheumatism	77	78	78	2
Neuralgia	78	78	71	Neuralgia	75	75	70	Neuralgia	63	63	73	3
Tonsillitis	57	59	65	Cholera morbus.	74	71	59	Cholera morbus.	75	78	72	4
Cholera morbus.	65	59	59	Dysentery	71	67	58	Tonsillitis	58	56	72	5
Bronchitis	59	59	55	Bronchitis	57	58	57	Dysentery	68	64	46	6
Dysentery	47	43	46	Tonsillitis	56	58	53	Intermittent fever	73	57	46	7
Intermittent fever	74	59	45	Cholera infantum	64	62	47	Influenza	40	37	44	8
Cholera infantum	47	46	38	Intermittent fever	74	59	34	Cholera morbus.	63	60	43	9
Inflam. of bowels.	33	32	35	Consumption, pul.	59	52	33	Consumption, pul.	58	50	37	10
Remittent fever.	55	44	31	Remittent fever	59	47	33	Typhoid fev (ent.)	30	30	36	11
Erysipelas	37	34	29	Inflam. of bowels.	37	39	30	Cholera infantum	57	55	35	12
Inflam. of kidney	33	33	29	Typhoid fev. (ent.)	23	23	27	Pleuritis	22	23	20	13
Influenza	31	30	28	Influenza	32	30	27	Remittent fever.	61	47	32	14
Pleuritis	21	28	33	Erysipelas.	33	32	24	Erysipelas	31	30	27	15
Consumption, pul.	61	53	26	Inflam. of kidney.	30	30	22	Inflam. of kidney.	27	27	27	16
Pneumonia	30	32	24	Pneumonia	25	19	17	Inflam. of bowels.	32	33	23	17
Typhoid fev. (ent.)	14	14	23	Pleuritis	20	16	20	Pneumonia	30	22	19	18
Measles	20	16	19	Typho-mal. fever.	32	23	12	Typho-mal. fever.	42	25	16	19
Whooping-cough.	30	23	15	Scarlet fever	17	13	8	Diphtheria	23	14	14	20
Scarlet fever	19	13	11	Whooping-cough.	30	23	8	Whooping-cough.	27	21	14	21
Inflam. of brain.	12	12	9	Cerebro-spi. men.	7	6	7	Scarlet fever.	18	14	9	22
Typho-mal fever.	21	14	8	Measles	10	8	6	Cerebro-spi. men.	6	6	6	23
Diphtheria	19	11	6	Inflam. of brain.	14	12	5	Inflam. of brain.	11	10	5	24
Puerperal fever.	10	9	5	Diphtheria	21	13	10	Puerperal fever.	9	8	5	25
Cerebro-spi. men.	7	6	4	Puerperal fever.	9	8	5	Measles	7	5	4	26
Membran. croup.	4	3	0	Membran. croup.	5	4	0	Membran. croup.	7	4	2	27
Small-pox.	1	0	0	Small-pox.	1	0	0	Small-pox.	1	0	0	28
Observers\$	97	111	80	Observers\$	100	114	83	Observers\$	99	114	81	
October.*				November.*				December.*				Line number.
Diseases.	Av 77-95.	Av 86-95.	1896.	Diseases.	Av 77-95.	Av 86-95.	1896.	Diseases.	Av 77-95.	Av 86-95.	1896.	
Average†	40	36	27	Average†	37	33	26	Average†	37	33	25	
Neuralgia	79	79	78	Rheumatism	83	83	82	Tonsillitis	79	78	84	1
Rheumatism	83	84	80	Neuralgia	81	80	77	Rheumatism	85	84	80	2
Bronchitis	77	71	72	Tonsillitis	75	74	76	Bronchitis	84	75	80	3
Tonsillitis	69	70	72	Bronchitis	77	75	74	Neuralgia	82	80	79	4
Diarrhea	75	76	61	Influenza	57	55	64	Influenza	66	70	78	5
Influenza	46	46	51	Diarrhea	54	53	42	Pneumonia	67	54	42	6
Intermittent fever	72	56	31	Pneumonia	55	54	36	Diarrhea	46	47	41	7
Dysentery	45	42	24	Pleuritis	61	51	35	Pleuritis	33	32	37	8
Remittent fever	60	48	25	Consumption, pul.	61	51	35	Inflam. of kidney.	64	44	29	9
Pneumonia	40	32	25	Inflam. of kidney.	32	32	28	Intermittent fever	40	38	28	10
Inflam. of kidney.	34	32	27	Intermittent fever	66	50	33	Erysipelas	40	38	28	11
Consumption, pul.	61	50	26	Remittent fever.	53	42	33	Inflam. of bowels.	42	26	24	12
Typhoid fev. (ent.)	34	33	25	Erysipelas	38	37	28	Consumption, pul.	62	52	24	13
Pleuritis	34	38	25	Diphtheria	31	28	17	Scarlet fever.	37	33	24	14
Inflam. of bowels.	29	29	24	Typhoid fev. (ent.)	25	24	16	Remittent fever.	31	18	17	15
Erysipelas	37	34	19	Inflam. of bowels.	25	24	15	Diphtheria	31	18	12	16
Cholera morbus.	32	30	15	Scarlet fever	24	14	11	Inflam. of brain.	11	11	12	17
Diphtheria	30	18	14	Cholera morbus.	15	14	9	Dysentery	14	14	10	18
Cholera infantum	26	25	10	Dysentery	22	21	9	Typhoid fev. (ent.)	20	17	9	19
Typho-mal fever.	44	30	17	Measles	9	9	4	Puerperal fever.	10	10	7	20
Puerperal fever.	10	10	9	Inflam. of brain.	33	19	6	Cerebro-spi. men.	6	5	7	21
Scarlet fever.	23	19	15	Typho-mal fever.	33	19	12	Cholera morbus.	12	10	6	22
Whooping-cough.	24	16	7	Cholera infantum.	24	18	5	Measles	12	9	6	23
Membran. croup.	11	9	4	Whooping-cough.	24	18	5	Whooping-cough.	24	15	6	24
Cerebro-spi. men.	7	5	3	Cerebro-spi. men.	6	6	3	Membran. croup.	17	13	5	25
Measles	6	6	3	Membran. croup.	15	11	3	Cholera infantum	25	14	2	26
Inflam. of brain.	10	10	13	Puerperal fever.	11	10	0	Typho-mal fever.	25	14	2	27
Small-pox.	1	0	0	Small-pox.	1	0	0	Small-pox.	1	0	0	28
Observers\$	97	110	89	Observers\$	98	109	88	Observers\$	94	105	86	

state how many observers reported for the month in the given years.

TABLE 2.—WEEKLY REPORTS OF DISEASES IN MICHIGAN IN 1896.—Exhibiting for the Year and for each Month of the Year Ending Saturday, January 2, 1897, a Summary relative to diseases in the State of Michigan; also for each month a Summary relative to Diseases in each of 11 Geographical Divisions* of the State.—Indicating the prevalence as regards Time and Area. Compiled from 3,940 Weekly Reports by 144 Observers, Health Officers of Cities and Villages, Regular Correspondents of the State Board of Health, and other Physicians, Reporting the Diseases under their observation.

Number of Observers, Reports, etc.	Diseases.	(Av. b) Per Cent of Observers report- ing prevalence of.	Average Per Cent of Weeks Reported Present.	Per Cent of Reports Stating Presence of.	Average Order of Prevalence Where Present.	Average Order of Prevalence where present.													Av. 1877- 1895.	Av. 1886- 1895.
						1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.			
{	Average for tabulated dis- eases reported present..}	21	62	18	2.7	3.0	3.0	3.3	3.1	3.3	3.3	3.3	3.5	3.7	3.7	3.8	4.2	3.8	3.3	
	Brain, inflammation of.....	7	35	3	4.1	4.0	4.8	4.3	3.9	4.9	5.4	4.8	6.4	6.2	5.9	6.0	6.4	5.8	5.1	
	Bowels, inflammation of ..	23	43	10	3.5	3.6	3.8	4.0	4.1	4.3	4.4	4.1	4.6	5.0	5.0	5.1	5.8	5.0	4.3	
	Bronchitis	70	73	51	2.4	2.6	2.6	2.5	2.6	2.7	2.6	2.7	2.7	3.0	3.0	3.1	3.2	3.0	2.7	
	Cerebro-spinal meningitis ..	4	33	1	3.6	3.7	3.9	4.4	3.7	5.3	4.7	4.2	4.6	7.8	7.3	6.9	6.9	5.9	5.0	
	Cholera infantum.....	15	52	8	2.9	3.0	3.3	3.4	3.6	3.6	3.5	3.4	4.0	4.1	3.9	4.6	4.8	4.3	3.6	
	Cholera morbus.....	23	47	11	2.9	3.0	3.3	3.3	3.4	3.4	3.5	3.4	3.7	3.8	4.2	4.5	4.9	4.3	3.5	
	Consumption, pulmonary.....	29	79	23	3.0	3.5	3.4	3.5	3.7	3.8	3.5	3.5	3.6	3.7	3.9	4.0	4.3	4.2	3.6	
	Croup, membranous.....	2	37	1	3.9	4.6	4.5	4.1	4.7	4.4	4.6	4.3	5.1	6.8	6.2	6.1	7.1	5.9	4.9	
	Diphtheria.....	10	52	5	3.7	4.4	3.5	3.4	3.5	4.4	4.2	4.3	4.8	4.4	4.2	4.7	5.1	4.7	4.1	
	Diarrhea.....	55	60	34	2.5	2.5	2.5	2.6	2.6	2.6	2.7	2.9	2.8	3.0	3.0	3.2	3.3	3.3	2.8	
	Dysentery.....	23	45	11	3.0	3.2	3.3	3.6	3.8	3.8	3.8	3.8	3.7	3.8	4.3	4.5	5.0	5.0	4.5	3.8
	Erysipelas.....	26	47	12	3.5	3.7	3.8	3.9	4.1	4.2	4.1	4.1	4.1	4.4	4.7	4.5	4.6	5.2	4.9	4.2
	Fever, intermittent.....	31	60	19	2.7	2.9	2.9	2.9	3.0	3.2	3.2	2.9	2.6	2.6	2.8	2.6	2.4	2.5	2.6	2.8
	Fever, remittent.....	27	60	16	2.9	3.1	3.1	2.9	2.9	2.9	3.3	3.2	3.2	3.1	3.4	3.3	3.2	3.3	3.2	3.2
Fever, typhoid (enteric)...	16	61	10	3.3	3.4	3.6	3.2	3.6	3.6	3.5	3.8	3.9	4.2	4.5	4.7	4.7	5.2	4.8	3.8	
Fever, typho-malarial	6	34	2	2.8	3.2	3.7	3.6	3.7	3.7	3.6	3.6	3.9	3.6	4.1	4.2	4.4	4.6	4.3	3.7	

Ending January 2, 1897.
localities represented, 128.
Observers during the year, 144.
Observers represented per month, 81.
Observers during the year, 144.
Observers represented per month, 81.
Reports compiled, 8,940.
reports per month, 328.

For the Year	Average number of Whole number of Average number of Total number of Average number of	59	74	44	1.8	2.0	2.2	2.0	2.1	2.0	2.2	2.4	2.7	3.0	2.7	2.9	3.3	2.7	2.3
Influenza	-----	59	74	44	1.8	2.0	2.2	2.0	2.1	2.0	2.2	2.4	2.7	3.0	2.7	2.9	3.3	2.7	2.3
Kidney, inflammation of	-----	29	55	16	3.5	3.6	3.7	3.7	3.6	3.9	4.1	4.1	4.5	4.9	4.7	4.4	5.0	4.2	4.1
Measles	-----	12	56	7	2.7	3.1	2.8	2.8	3.3	3.0	3.0	3.5	3.2	3.6	5.0	6.4	5.2	4.1	3.3
Neurakia	-----	74	74	54	2.3	2.5	2.5	2.5	2.5	2.8	2.7	2.6	2.7	2.8	2.8	2.8	3.3	3.1	2.6
Pleuritis	-----	32	50	16	3.4	3.8	3.8	3.8	4.0	4.1	4.2	4.0	4.4	-----	-----	-----	-----	4.0	4.0
Pneumonia	-----	34	51	18	3.2	3.7	3.7	3.6	3.7	4.0	3.9	3.7	4.0	4.3	4.0	4.4	4.5	4.3	3.9
Puerperal fever	-----	6	31	2	3.2	3.5	3.9	3.8	4.1	4.5	4.5	3.4	4.6	5.7	5.9	6.3	6.9	5.6	4.4
Rheumatism	-----	78	76	60	2.8	2.7	2.6	2.6	2.7	2.9	2.9	2.8	3.0	3.2	3.2	3.2	3.6	3.4	2.9
Scarlatina	-----	14	58	8	3.1	3.5	3.3	3.6	3.2	4.2	4.2	3.9	4.6	5.0	4.5	5.0	5.2	4.7	4.0
Small-pox	-----	1	74	4	6.3	2.8	4.1	4.8	5.0	0	6.5	11.0	15.3	26.0	25.9	8.4	26.0	10.3	10.1
Tonsillitis	-----	70	61	45	2.6	3.0	3.0	2.8	2.9	3.3	3.4	3.3	3.4	3.4	3.4	3.5	3.7	3.5	3.2
Whooping-cough	-----	12	56	7	2.4	2.6	2.9	3.0	3.0	2.9	3.2	3.3	3.9	4.2	3.7	4.1	4.5	4.1	3.3

* For counties in each Division, see Exhibit L.

† For number of Observers, reports, weeks in each month, etc., see Exhibit III.; for names of observers, and number of reports received from each, see Exhibit V. a. Not every one of the observers sent in a report for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks.

b. The numbers in this column (pages 102-105) state not what per cent of the who's number of observers for the year reported the disease present at some time during the year, but the average (for the twelve months) of the per cents (of observers making reports for the several months) by which the disease was reported present in those months. The column for the year is thus a statement for an average month. But on pages 104 and 105 the numbers in the "Per Cent of Observers" column are statements for the month, and not averages. This column indicates the Area of Prevalence except that in a few instances there were two or more observers in one city or village.

c. This column states for the year or given month, what per cent the number of reports which stated a disease to be present is of the number of card-reports received, for the given time, from such of the observers as reported the diseases present. It is therefore an average, not for all localities represented, but only for those at which the given disease was reported present. In the line "Average for Tabulated Diseases" it states what per cent the number of times *all* diseases were reported present is of the number of times they *might have been* so reported on the cards received, for the time specified, from the observers who during that time reported the diseases present (that is, if each of the observers had on every card he sent reported every disease present which he reported present at all). It will be seen that this is a more accurate average than would be obtained by dividing the sum of the column by the number of diseases reported present.

d. This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from *all* observers in the State or Division, as the case may be. It combines, and states in a general way, an idea of the *time* a disease was prevalent, with an idea of the area of its prevalence. Had every observer sent a report every week of the month or year, the numbers in this column would be (for the State) the product of the numbers in the same line in the two preceding columns.

e. The disease having the greatest number of cases was to be marked 1 in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals (for the State) of the Order of Prevalence column, in Table 3 (a table giving statements for each locality, omitted in printing this Report, for want of room), by the number of observers who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present by the sum of the numbers of observers who reported the difference of the diseases present, thus counting each observer once for every disease he reported present. Also the rule small numbers in this column indicate a large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer from week to week, the greater will be the "average" in this column.

Av. for Tab. Dis. Rep. Pres...	31	55	17	2.6	29	61	18	2.7	32	56	18	2.6	27	63	17	2.5	26	65	17	2.6	28	61	17	2.7
Brain, inflammation of	9	24	2	1.9	5	50	2	6.0	5	20	1	3.3	1	33	0.3	2.0	8	33	3	3.0	12	33	4	3.4
Bowels, inflammation of	35	37	13	3.0	30	50	15	3.8	23	36	8	3.5	24	47	10	3.2	15	48	7	3.1	24	39	7	3.8
Bronchitis	55	67	38	2.6	57	63	35	3.0	73	64	46	2.4	72	74	53	2.2	74	80	59	2.2	80	77	61	2.7
Cerebro-spinal meningitis	4	23	1	3.7	7	33	2	4.2	6	25	2	3.0	2	25	1	3.5	3	60	2	3.0	7	28	2	2.7
Cholera infantum	38	54	20	2.8	47	61	29	2.7	35	52	18	3.0	11	39	4	2.7	5	27	1	2.0	2	40	1	2.5
Cholera morbus	59	45	27	2.7	59	62	36	2.7	43	49	21	2.6	15	43	6	2.8	9	35	4	2.9	6	26	2	2.2
Consumption, pulmonary	25	85	22	2.5	33	76	25	3.0	37	69	25	2.7	26	84	22	2.9	25	76	22	2.8	24	33	21	2.9
Croup, membranous	0	0	0	0	0	0	0	0	0	30	1	1.5	4	25	1	3.3	3	50	2	3.3	5	38	2	3.3
Diphtheria	6	32	2	4.0	5	71	3	4.8	14	40	6	2.7	15	67	10	2.8	17	64	12	3.2	17	51	9	3.1
Diarrhea	79	72	56	1.8	88	74	65	1.6	83	71	58	1.8	61	58	36	2.4	42	51	23	2.5	41	36	15	3.4
Dysentery	46	45	21	2.8	58	56	33	2.8	46	51	24	3.1	19	42	13	3.0	22	37	9	3.3	10	26	3	2.7
Erysipelas	29	36	11	3.3	24	46	11	3.7	27	45	12	3.3	21	52	10	3.2	22	38	3	3.3	28	48	13	3.8
Fever, intermittent	45	53	24	2.2	34	66	23	2.3	46	49	23	2.4	31	69	22	2.5	25	67	17	2.8	29	52	15	2.8
Fever, remittent	31	53	17	3.0	33	68	22	2.5	32	60	20	2.4	28	59	17	2.9	25	58	15	2.8	22	62	14	3.1
Fever, typhoid (enteric)	23	46	9	3.4	27	59	16	2.9	36	69	24	2.3	25	68	17	2.9	16	69	11	3.4	9	55	4	3.4
Fever, typho-malarial	8	26	2	2.5	12	29	4	3.0	16	36	5	1.8	10	55	6	2.3	7	83	2	2.8	2	22	1	5.0
Influenza	28	45	18	2.1	27	61	16	2.3	44	60	27	2.0	57	67	39	2.0	64	78	49	1.9	78	75	58	1.6
Kidney, inflammation of	29	45	13	3.9	22	49	11	3.7	27	48	13	3.2	27	51	14	3.3	28	53	15	3.4	36	41	15	3.6
Malaria	19	47	9	2.7	6	30	2	3.4	4	27	1	2.3	2	75	2	1.0	9	37	3	2.5	6	64	4	2.0
Neuralgia	71	63	44	2.2	70	63	43	2.7	72	64	45	2.3	78	73	56	2.1	77	76	59	2.3	79	74	57	2.4
Phenitis	28	39	11	2.9	16	40	6	3.5	35	40	14	3.2	25	45	11	2.9	35	49	18	3.1	37	45	17	3.3
Pneumonia	24	42	10	2.9	17	40	7	2.6	19	36	7	2.4	28	42	12	3.0	36	45	18	3.0	42	47	20	3.4
Rheumatic fever	5	21	1	3.3	5	29	1	2.8	5	20	1	4.3	8	36	3	2.9	1	25	0.3	1.0	7	30	2	3.0
Rheumatism	74	73	54	2.1	71	71	52	2.5	75	69	54	2.3	76	79	60	2.2	82	79	65	2.2	80	79	63	2.4
Scarlatina	11	59	6	3.7	8	54	5	3.4	9	67	6	2.9	7	45	3	1.7	11	49	6	2.9	24	51	12	3.1
Small-pox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transitory	15	52	33	2.8	53	57	30	3.0	72	55	40	2.6	72	65	47	2.3	76	73	56	2.3	84	70	58	2.2
Whooping cough	65	53	8	1.3	8	59	4	1.9	14	39	5	2.9	7	68	5	2.7	5	50	2	2.5	6	35	2	2.6

[Foot-notes from page 99.]

† The numbers opposite the names of the diseases do not state what per cent of the whole number of observers for the year reported the disease present at some time during the year, but state (on an average for the 12 months of the year) by what per cent of the observers making reports for the several months, the disease was present in those months. The columns for each year is thus a statement for an average month of that year. In the two following pages of this table, however, the columns for each month state what per cent of the observers for that month (the number of whom is stated at the foot of the column) reported the given disease.

‡ Consumption, malarial typho-malarial fever were not printed on the first blanks used in making weekly reports (beginning with the month of September, 1876); neuralgia and typhoid fever were not printed on any blanks prior to October, 1878, and not on all used for several months after that date; inflammation of brain and inflammation of bowels were not printed on any blanks used prior to July, 1879, and not on all used for several months after that date; inflammation of kidney was not printed on any of the cards used prior to October, 1883, and not on all used for several months after that date; pleuritis was not printed on any cards used prior to 1888; hence it is probable that the diseases were not so fully reported at first as were the other diseases.

TABLE 2.—CONTINUED.—Diseases in the Upper Peninsula, the Northwestern, the Northern, and the Northeastern Divisions of the State for the years 1871-1895, also for the years 1886-1895, for the year and by Months in 1896.—Indicating what Per Cent of the Weekly Reports Received Stated the Presence of the Diseases Named.¹

Division.*	Diseases.	Upper Peninsular Division.*												Northwestern Division.*																		
		1877-1895,†	1886-1895.	1896.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Division.*	1877-1895,†	1886-1895.	1896.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Av. for Tab. Dis. Rep. Pres.	27	25	15	17	13	14	11	6	12	26	19	27	25	14	12		28	25	21	28	24	19	14	22	23	19	23	22	17	23	21
	Brain, inflammation of.	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0		5	6	1	0	0	7	0	6	0	4	0	0	0	0	0
	Bronchitis, inflammation of.	17	19	12	0	0	0	0	18	20	33	40	50	20	0	0		12	14	11	0	13	0	0	25	6	12	44	0	0	0	0
	Bronchitis.	71	69	48	60	20	23	31	44	36	100	67	40	100	60	54		62	63	62	100	73	60	62	69	56	40	39	70	69	70	65
	Cerebro-spi. meningitis.	3	3	1	0	0	0	0	0	0	0	17	0	0	0	0		2	0.5	0	0	0	0	0	0	0	6	16	33	15	0	0
	Cholera infantum.	14	15	13	0	0	0	0	9	60	100	60	0	0	0	0		20	18	7	0	0	0	0	6	19	48	28	25	0	0	4
	Cholera morbus.	19	21	10	0	0	0	0	9	20	67	60	25	0	0	0		20	17	15	10	9	7	0	6	19	48	28	25	0	0	4
	Consumption, pulmonary.	59	45	42	13	0	0	0	33	55	100	67	10	100	100	77		43	38	30	50	64	47	23	25	38	48	44	15	0	15	9
	Croup, membranous.	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0		5	3	3	50	9	0	0	0	0	0	0	0	0	0	4
	Diphtheria.	10	12	7	0	0	0	0	0	0	20	0	0	25	60	15		11	6	15	20	18	0	0	13	19	4	28	15	31	35	4
	Diarrhea.	61	60	32	27	40	38	23	0	18	60	50	100	50	40	15		52	46	49	60	55	33	31	31	63	68	67	65	44	45	26
	Dysentery.	23	20	9	13	30	13	8	0	0	20	0	0	0	0	0		26	23	11	0	18	0	0	6	0	32	33	20	6	0	0
	Erysipelas.	21	17	12	27	10	25	23	0	9	0	0	20	0	0	0		27	20	6	0	0	0	0	6	13	4	0	10	0	5	26
	Fever, intermittent.	7	5	0	0	0	0	0	0	0	0	0	0	0	0	0		34	34	34	0	0	0	0	44	63	44	41	50	44	40	39
	Fever, remittent.	9	4	1	0	0	0	0	11	0	0	0	0	0	0	0		52	46	49	60	55	33	31	31	63	68	67	65	44	45	26
	Fever, typhoid (enteric).	29	28	19	13	40	0	0	0	18	60	33	80	75	0	0		11	12	14	40	45	0	0	31	13	4	28	10	13	15	0
	Fever, typho-malarial.	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0		54	34	34	0	0	0	0	44	63	44	41	50	44	40	39
	Influenza.	42	36	33	53	50	50	31	22	18	0	17	0	60	38	8		32	29	38	70	0	0	0	50	44	40	56	70	53	33	30
	Kidney, inflammation of.	31	25	13	33	20	25	23	0	0	20	0	0	0	0	0		11	12	14	40	45	0	0	31	13	4	28	10	13	15	0
	Measles.	14	11	4	0	0	0	0	0	0	0	0	0	0	0	0		19	9	5	0	0	0	7	0	0	22	5	6	5	4	4
	Neuralgia.	57	58	42	67	40	50	46	0	9	60	0	100	0	0	38		44	41	52	100	100	87	62	38	25	16	11	35	44	75	78
	Pleuritis.	22	22	5	0	0	0	0	33	9	0	0	0	0	0	8		23	17	15	20	27	13	0	0	6	8	6	20	13	45	17
	Pneumonia.	35	30	7	0	0	0	0	0	18	100	0	0	0	0	0		12	9	16	0	18	27	23	50	56	70	0	0	0	10	0
	Peripneural fever.	6	6	1	0	0	0	0	0	0	0	0	0	0	0	0		65	60	56	50	73	73	54	50	44	48	50	55	56	65	61
	Rheumatism.	61	57	25	33	20	25	23	11	45	0	17	20	75	0	23		21	21	15	20	55	27	38	13	6	4	0	5	0	30	9
	Scarlatina.	23	15	27	53	40	63	54	0	0	18	100	0	0	0	0		39	40	24	60	36	40	31	31	44	12	0	0	13	40	17
	Small-pox.	0.3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0		5	4	2	0	0	0	0	25	6	0	0	0	0	0	0
	Tonsillitis.	52	57	47	60	30	63	38	22	18	60	33	80	100	60	54		15	9	1	0	0	0	0	0	0	0	0	0	0	0	0
	Whooping-cough.	22	20	4	13	10	0	0	9	0	0	0	0	0	0	0		54	51	52	60	36	40	23	44	56	36	61	60	44	65	78

Av. for Tab. Dis. Rep. Pres.	20	19	26	22	26	21	13	15	16	15	21	19	19	19	26	24	19	31	16	21	24	22	25	20	30	18	13	12	17
Brain, inflammation of.....	10	13	10	12	17	31	38	8	11	0	0	0	0	16	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Bowels, inflammation of.....	9	12	14	18	11	19	0	15	17	14	6	10	21	17	20	18	28	103	13	57	44	50	38	15	71	17	11	7	0
Bronchitis.....	52	52	65	94	78	100	63	31	33	32	23	85	74	83	84	70	66	62	50	57	100	63	100	69	71	50	33	50	58
Cerebro-spi. meningitis.....	4	4	5	0	0	0	0	8	17	0	0	5	0	25	6	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Chorea infantum.....	8	9	4	6	0	0	0	11	5	18	0	11	0	0	8	7	6	0	0	0	0	0	0	46	23	0	0	0	0
Cholera morbus.....	8	9	7	6	0	0	0	11	27	6	0	5	10	0	9	7	4	0	0	0	0	0	0	23	29	0	0	0	0
Consumption, pulmonary.....	32	39	12	29	33	19	0	31	0	0	0	0	8	10	30	30	20	0	0	0	0	0	0	15	0	17	33	36	53
Croup, membranous.....	22	22	27	6	0	0	0	0	0	0	0	0	23	0	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Diphtheria.....	7	7	0	11	0	0	0	0	5	0	0	0	16	10	10	10	1	0	0	0	0	0	0	0	0	0	0	0	5
Diarrhea.....	26	20	32	29	11	38	0	0	23	55	59	45	42	25	51	45	45	100	38	57	41	38	63	77	71	42	28	29	21
Dysentery.....	15	12	17	35	6	19	0	0	22	27	53	35	21	8	16	12	5	0	0	0	0	0	0	8	57	8	0	0	0
Erysipelas.....	23	23	27	33	33	25	38	38	22	5	29	50	26	8	26	26	30	0	38	43	33	50	38	31	71	42	22	14	16
Fever, intermittent.....	25	25	15	18	0	13	25	8	11	14	6	25	42	17	31	36	0	0	0	0	0	0	0	0	0	0	0	0	0
Fever, remittent.....	1	1	12	29	11	13	0	0	0	5	29	20	26	0	2	3	1	0	0	0	0	0	0	0	14	0	0	0	0
Fever, typhoid (enteric).....	9	8	6	24	11	0	0	0	6	14	6	5	5	0	2	1	7	0	0	0	0	0	13	8	0	33	17	0	0
Fever, typho-malarial.....	6	4	3	12	0	0	0	0	9	6	6	0	0	0	6	4	7	0	0	0	0	0	0	0	0	33	28	0	0
Influenza.....	33	33	43	47	67	75	75	46	28	23	12	25	37	25	52	59	46	100	50	57	56	50	50	38	57	42	33	36	42
Kidney, inflammation of.....	18	19	22	59	56	50	0	0	0	9	6	15	5	8	38	36	41	100	50	57	56	50	50	30	38	57	42	22	26
Measles.....	7	4	6	0	0	0	0	8	28	18	0	0	0	8	7	6	8	0	0	0	0	0	13	0	0	0	0	7	42
Nouralgia.....	49	41	61	59	83	69	63	46	67	59	47	45	63	67	69	64	53	100	50	57	56	50	50	54	86	42	44	43	53
Pleuritis.....	22	22	31	53	39	63	50	23	17	18	6	40	26	25	21	21	34	100	38	57	56	50	50	23	43	33	17	14	16
Pneumonia.....	20	20	19	59	28	44	0	8	6	9	6	20	21	17	28	23	18	0	38	29	56	50	38	0	0	0	6	0	26
Pyærial fever.....	5	4	8	6	6	6	50	8	0	5	6	5	5	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheumatism.....	58	55	69	59	89	100	100	54	56	73	47	70	58	83	68	63	57	100	50	57	73	63	88	54	71	42	44	36	58
Scarlatina.....	4	4	1	0	0	0	0	0	0	0	0	0	0	3	7	7	8	0	0	0	0	0	0	0	0	0	17	14	26
Small-pox.....	0.2	0.3	0	0	0	0	0	0	0	0	0	0	0	0	.08	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis.....	33	35	39	47	33	38	38	31	17	14	29	40	53	67	57	51	31	60	38	57	56	50	63	15	57	33	11	29	21
Whooping-cough.....	8	8	5	18	0	19	0	0	0	5	6	5	11	0	6	6	16	0	0	0	0	0	63	38	57	17	0	0	0

*, †, ‡ See page 103. † Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 16 years, 1880-95; for neuralgia and tonsillitis, an average for the 17 years, 1879-95; pleuritis was not compiled until 1888; for other diseases and for the average line, an average for the 19 years, 1877-95. For the Northern Division, 1882-95. For the Northeastern Division, 1883-95.

TABLE 2.—CONTINUED.—*Diseases in the Western, Northern Central, Bay and Eastern, and the Central Divisions of the State, for the Years 1887-1895, also for the Years 1886-1895, for the Year and by Months in 1896, indicating what Per Cent of the Weekly Reports Received Stated the Presence of the Diseases Named.*

Diseases.	Division.*												Western Division.*											
	Av. for Tab.	Dis.	Rep.	Pres.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.	1896.	1886-1895.
Brain, inflammation of.	4	1	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0
Bowels, inflammation of.	16	15	11	11	0	16	12	29	15	6	12	13	6	8	4	6	8	0	10	25	0	0	0	0
Bronchitis.	51	48	45	52	56	57	64	36	21	15	25	43	58	49	52	56	42	40	38	20	0	20	100	100
Cerebro-spi. meningitis.	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	50	0	0	0	0
Cholera infantum.	13	10	5	0	6	0	8	4	13	12	0	0	3	5	6	0	0	0	20	50	0	0	0	0
Cholera morbus.	17	14	8	0	4	8	4	21	31	14	0	0	0	12	13	6	0	0	25	20	0	0	0	0
Consumption, pulmonary.	44	39	17	11	14	20	20	17	12	19	19	29	25	0	33	30	15	12	30	50	0	0	0	0
Croup, membranous.	5	3	2	0	4	0	0	0	0	0	0	0	0	0	5	2	1	0	10	0	0	0	0	0
Diphtheria.	18	8	5	0	6	0	0	0	0	0	0	2	16	3	3	0	0	0	38	0	0	0	0	0
Diarrhea.	45	44	25	15	22	11	8	28	21	38	50	43	27	19	19	4	0	8	50	25	40	75	100	25
Dysentery.	21	16	9	4	6	0	16	4	18	19	12	9	3	5	16	14	0	0	10	0	0	100	80	0
Erysipelas.	25	20	13	15	33	11	20	4	8	15	9	5	11	14	16	8	11	8	20	50	0	0	0	0
Fever, intermittent.	60	47	30	26	11	21	32	28	13	29	9	26	11	19	11	20	17	25	0	38	20	75	100	0
Fever, remittent.	51	37	26	41	22	20	24	50	26	31	12	20	17	30	33	22	16	11	30	13	0	100	75	0
Fever, typhoid (enteric).	5	7	0	0	0	0	0	0	0	0	13	24	4	0	9	11	0	0	38	60	75	40	0	0
Fever, typho-malarial.	18	11	5	0	0	0	0	4	0	4	0	14	13	11	0	18	9	0	0	0	0	0	0	0
Influenza.	46	46	42	67	72	79	48	24	17	12	9	38	38	56	62	42	24	56	75	13	0	25	60	75
Kidney, inflammation of.	20	20	25	41	33	39	32	28	29	29	19	12	13	25	19	8	10	4	30	50	60	0	0	0
Measles.	6	9	22	39	18	4	8	13	0	0	0	0	0	0	12	8	6	4	30	13	0	0	0	0
Neuralgia.	69	67	46	63	56	64	44	32	23	29	41	43	58	62	52	50	51	48	30	75	40	75	60	100
Pleuritis.	19	19	13	15	11	11	0	13	12	13	24	11	11	24	7	10	12	6	50	63	100	100	100	100
Pneumonia.	34	28	16	19	17	25	24	8	6	6	10	18	19	27	23	14	8	28	25	0	0	0	0	0
Peripneumonia.	6	5	1	7	0	0	0	0	0	0	2	0	0	0	6	3	4	0	0	0	0	0	0	0
Rheumatism.	63	64	60	63	72	71	52	36	50	71	63	50	62	75	57	56	55	36	50	63	100	100	100	100
Scarlatina.	17	9	8	0	0	0	0	12	17	15	16	19	0	6	10	9	0	0	0	0	0	0	0	0
Small-pox.	0.6	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0
Tonsillitis.	50	47	40	33	28	43	24	4	17	26	19	60	49	75	49	42	36	56	50	38	60	25	0	25
Whooping-cough.	13	10	8	22	0	0	0	12	13	3	3	14	16	8	11	9	5	4	13	0	0	0	0	50

Av. for Tab. Dis. Rep. Pres.	29	23	15	14	16	19	19	13	14	11	15	17	14	15	13	25	22	18	19	20	19	18	16	17	18	20	18	17	17	18
Brain, inflammation of.....	5	4	1	0	0	0	0	4	4	3	3	2	0	0	0	4	4	3	1	6	0	2	1	1	2	3	1	0	6	10
Bowels, inflammation of.....	19	17	5	11	0	3	4	4	0	3	3	5	9	12	8	14	15	9	4	15	11	12	1	1	4	16	14	9	11	8
Bronchitis.....	64	56	41	50	48	55	41	31	31	23	40	34	35	53	43	54	53	56	59	63	62	54	49	56	52	45	50	53	55	70
Cerebro-spi. meningitis.....	5	3	2	0	0	3	0	0	0	0	3	2	3	3	3	3	3	0	4	0	0	0	0	1	1	0	1	0	0	0
Cholera infantum.....	16	14	10	3	0	0	0	15	29	37	25	6	3	6	3	10	9	6	0	0	0	1	2	4	6	17	28	9	3	4
Cholera morbus.....	19	17	11	3	0	0	6	12	31	17	37	23	6	0	3	14	14	9	3	0	0	2	5	22	19	37	16	1	3	0
Consumption, pulmonary.....	60	50	23	24	24	28	25	58	27	14	13	16	24	24	10	51	42	32	28	28	26	29	29	31	32	39	44	37	35	33
Croup, membranous.....	7	4	3	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	4	2	1	0	1	0	0	0	6	0	0	0
Diphtheria.....	20	11	12	11	3	3	9	0	0	0	0	14	26	35	31	14	5	2	4	5	1	0	1	0	0	0	0	0	1	7
Diarrhea.....	46	41	25	11	10	7	25	19	46	40	47	57	26	9	0	43	44	36	18	24	17	19	24	38	69	80	68	38	20	11
Dysentery.....	17	14	10	0	0	0	13	8	19	14	13	25	12	3	5	14	14	11	6	1	0	2	3	10	13	41	33	16	1	4
Erysipelas.....	21	17	5	0	3	7	9	4	0	3	13	2	0	6	10	18	19	13	12	16	19	11	11	14	12	11	14	14	10	10
Fever, intermittent.....	54	31	8	0	0	0	3	8	15	6	13	14	12	12	15	56	40	12	7	14	14	13	17	19	20	15	14	7	7	17
Fever, remittent.....	34	21	8	3	17	3	3	15	4	11	13	16	3	6	0	39	31	16	26	14	14	13	7	10	18	23	18	18	20	18
Fever, typhoid (enteric).....	11	13	17	13	7	17	16	8	15	11	17	32	29	18	10	12	12	9	11	4	0	0	0	1	12	23	30	22	9	0
Fever, typho-malarial.....	22	14	1	0	0	0	0	4	0	3	3	5	0	0	0	13	8	2	1	1	0	1	0	0	3	4	4	8	3	0
Influenza.....	41	39	38	47	79	97	72	27	12	3	7	20	29	29	41	39	40	46	65	87	78	54	32	31	24	20	28	34	43	57
Kidney, inflammation of.....	17	15	6	0	3	0	3	8	12	0	7	9	3	15	10	21	21	15	19	25	15	19	19	22	15	10	12	9	9	8
Measles.....	13	10	9	0	10	24	34	19	12	11	3	5	0	0	0	9	7	5	0	5	9	8	11	7	7	4	0	0	1	5
Neuralgia.....	66	61	39	53	45	48	53	35	27	26	30	43	44	29	31	64	67	62	73	70	73	66	61	54	54	55	46	61	67	61
Pleuritis.....	20	20	20	21	28	31	31	15	19	9	3	23	6	29	21	15	15	14	11	13	30	22	17	10	11	3	4	14	22	11
Pneumonia.....	34	25	19	29	31	52	25	0	12	11	20	9	15	12	15	28	23	18	15	33	32	30	12	18	12	11	6	9	25	19
Puerperal fever.....	4	4	3	3	3	3	0	4	0	3	0	6	3	8	3	4	4	1	-	0	0	0	0	3	0	1	3	0	0	0
Rheumatism.....	70	64	41	42	48	59	63	38	35	49	37	45	29	53	41	63	66	67	72	77	69	71	80	57	55	55	54	65	64	81
Scarlatina.....	15	11	9	18	0	7	16	4	23	3	7	7	0	3	15	11	9	9	23	11	16	8	4	7	12	7	3	4	3	7
Small-pox.....	0.7	.03	3	0	10	21	6	0	0	0	0	0	0	0	0	0.3	0.1	1	0	3	5	0	0	0	0	0	0	0	0	0
Tonsillitis.....	47	41	43	53	48	48	56	27	27	26	43	43	47	44	49	42	43	49	56	54	49	52	49	46	44	30	33	53	57	63
Whooping-cough.....	19	13	5	3	14	14	9	0	3	10	7	0	0	3	3	14	10	6	6	5	7	7	7	14	9	4	8	5	3	0

*. †, d. See page 103. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 16 years, 1880-95; for neuralgia and tonsillitis, an average for the 17 years, 1879-95; pleuritis was not compiled until 1888; for other diseases, and for the average line, an average for the 19 years, 1877-95.

Bay and Eastern Division.*

Central Division.*

TABLE 2.—CONTINUED.—Diseases in the Southwestern and Southern Central Divisions of the State, for the years 1877-95; also for the years 1886-95, for the Year and by Months in 1896.—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Diseases named.^a

Division.*	Diseases.	Av. for Tab. Dis. Rep. Pres.	1877-1895.†	1896.†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Southwestern Division.*	Brain, inflammation of....	4	3	4	11	13	0	4	3	0	5	0	0	0	5	7
	Bowels, inflammation of....	54	12	16	43	44	32	54	39	27	28	24	38	28	71	27
	Bronchitis.....	11	54	43	44	43	54	39	27	30	3	5	1	0	13	0
	Cerebro-spinal meningitis.....	2	1	3	0	0	0	0	6	0	53	64	58	23	5	0
	Cholera infantum.....	18	16	13	0	0	0	0	0	0	0	0	0	0	0	0
	Cholera morbus.....	16	18	15	0	0	7	0	0	6	40	56	42	14	0	3
	Consumption, pulmonary.....	61	50	18	22	10	13	19	18	25	24	21	14	10	13	0
	Croup, membranous.....	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diphtheria.....	9	4	1	4	10	0	0	0	3	0	0	0	0	0	0
	Diarrhea.....	38	38	39	26	23	18	21	16	39	73	92	71	41	14	20
	Dysentery.....	15	17	16	0	7	0	0	6	18	38	48	38	27	5	3
	Erysipelas.....	22	23	24	26	33	39	4	19	18	28	20	4	18	38	40
	Fever, intermittent.....	62	44	41	50	29	50	42	27	35	52	50	50	33	40	33
	Fever, remittent.....	42	33	36	33	40	43	33	19	30	25	4	36	48	37	44
	Fever, typhoid (enteric).....	6	6	4	0	0	0	0	0	0	3	4	17	18	10	9
	Fever, typho-malarial.....	17	14	1	0	0	0	0	0	3	3	0	0	0	0	14
	Influenza.....	45	46	50	70	83	96	75	32	27	15	16	33	41	71	63
	Kidney, inflammation of.....	16	17	13	22	30	11	0	13	0	5	4	8	42	10	23
	Measles.....	10	10	7	10	21	13	13	6	13	4	0	0	0	0	9
	Neuralgia.....	69	64	57	67	64	63	52	53	55	40	42	68	71	63	70
	Pleuritis.....	18	21	37	30	39	8	10	21	18	12	8	14	24	30	16
	Pneumonia.....	30	28	15	40	57	38	0	6	3	4	8	18	24	50	32
	Puerperal fever.....	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rheumatism.....	76	76	75	85	77	64	92	77	58	60	71	86	90	90	72
	Scarlatina.....	11	9	26	27	7	0	0	0	3	0	0	14	14	17	14
	Smallpox.....	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
	Tonsillitis.....	46	47	48	84	57	46	54	48	27	28	12	38	59	67	51
	Whooping-cough.....	14	13	12	4	20	14	33	3	24	18	4	0	0	0	15
Southern Central Division.*	Brain, inflammation of....	4	3	4	11	13	0	4	3	0	5	0	0	0	5	7
	Bowels, inflammation of....	54	12	16	43	44	32	54	39	27	28	24	38	28	71	27
	Bronchitis.....	11	54	43	44	43	54	39	27	30	3	5	1	0	13	0
	Cerebro-spinal meningitis.....	2	1	3	0	0	0	0	6	0	53	64	58	23	5	0
	Cholera infantum.....	18	16	13	0	0	0	0	0	0	0	0	0	0	0	0
	Cholera morbus.....	16	18	15	0	0	7	0	0	6	40	56	42	14	0	3
	Consumption, pulmonary.....	61	50	18	22	10	13	19	18	25	24	21	14	10	13	0
	Croup, membranous.....	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diphtheria.....	9	4	1	4	10	0	0	0	3	0	0	0	0	0	0
	Diarrhea.....	38	38	39	26	23	18	21	16	39	73	92	71	41	14	20
	Dysentery.....	15	17	16	0	7	0	0	6	18	38	48	38	27	5	3
	Erysipelas.....	22	23	24	26	33	39	4	19	18	28	20	4	18	38	40
	Fever, intermittent.....	62	44	41	50	29	50	42	27	35	52	50	50	33	40	33
	Fever, remittent.....	42	33	36	33	40	43	33	19	30	25	4	36	48	37	44
	Fever, typhoid (enteric).....	6	6	4	0	0	0	0	0	0	3	4	17	18	10	9
	Fever, typho-malarial.....	17	14	1	0	0	0	0	0	3	3	0	0	0	0	14
	Influenza.....	45	46	50	70	83	96	75	32	27	15	16	33	41	71	63
	Kidney, inflammation of.....	16	17	13	22	30	11	0	13	0	5	4	8	42	10	23
	Measles.....	10	10	7	10	21	13	13	6	13	4	0	0	0	0	9
	Neuralgia.....	69	64	57	67	64	63	52	53	55	40	42	68	71	63	70
	Pleuritis.....	18	21	37	30	39	8	10	21	18	12	8	14	24	30	16
	Pneumonia.....	30	28	15	40	57	38	0	6	3	4	8	18	24	50	32
	Puerperal fever.....	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rheumatism.....	76	76	75	85	77	64	92	77	58	60	71	86	90	90	72
	Scarlatina.....	11	9	26	27	7	0	0	0	3	0	0	14	14	17	14
	Smallpox.....	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
	Tonsillitis.....	46	47	48	84	57	46	54	48	27	28	12	38	59	67	51
	Whooping-cough.....	14	13	12	4	20	14	33	3	24	18	4	0	0	0	15

*. †. ‡. See page 103. † Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 16 years, 1880-95; for neuralgia and tonsillitis, an average for the 17 years, 1879-95; pleuritis was not compiled until 1888; for other diseases and for the average line, an average for the 19 years, 1877-95.

TABLE 4.—A summary for the Year 1896, relative to Diseases in each of the Eleven Divisions of the State,—indicating the prevalence as regards both Time and Area.

Diseases.	Upper Peninsula Division.*				Northwestern Division.*				Northern Division.*				Northeastern Division.*				Western Division.*			
	Per Cent of Observers Reporting Presence of b	Av. Per Cent of Weeks Reported Present where c	Ing Presence of d	Av. Order of Prevalence e	Per Cent of Observers Reporting Presence of b	Av. Per Cent of Weeks Reported Present where c	Ing Presence of d	Av. Order of Prevalence e	Per Cent of Observers Reporting Presence of b	Av. Per Cent of Weeks Reported Present where c	Ing Presence of d	Av. Order of Prevalence e	Per Cent of Observers Reporting Presence of b	Av. Per Cent of Weeks Reported Present where c	Ing Presence of d	Av. Order of Prevalence e	Per Cent of Observers Reporting Presence of b	Av. Per Cent of Weeks Reported Present where c	Ing Presence of d	Av. Order of Prevalence e
Av. for Tab. Dis. Reported Present	22	62	15	2.6	32	65	21	3.6	33	58	19	2.7	24	75	11	3.0	28	58	17	2.4
Brain, inflammation of.....	0	50	12	0	6	25	1	4.7	22	43	10	3.9	0	0	0	0	4	27	1	3.4
Bowels, inflammation of.....	24	66	48	2.4	24	85	62	5.1	33	80	14	2.3	72	52	26	3.9	71	40	11	2.4
Bronchitis.....	3	25	1	3.0	2	20	0.5	3.2	11	43	5	3.3	47	83	62	2.5	63	31	45	1.6
Cerebro-spinal meningitis.....	17	72	13	1.4	10	70	7	3.0	13	41	4	3.4	9	6	6	2.0	13	34	5	2.0
Cholera infantum.....	17	48	10	1.6	29	53	15	4.4	15	45	7	2.1	9	6	4	2.0	4	4	1	4.0
Cholera morbus.....	41	94	42	2.7	39	80	30	4.2	18	64	12	2.8	6	63	4	2.5	17	41	8	2.3
Consumption, pulmonary.....	0	0	0	0	6	50	3	6.0	5	56	2	1.7	0	0	0	3.0	27	68	17	2.6
Croup, membranous.....	14	41	7	2.8	29	53	15	5.4	11	58	7	1.7	3	20	1	2.0	8	59	2	2.6
Diphtheria.....	59	52	32	2.9	71	69	49	3.1	31	55	32	2.2	53	79	45	3.0	54	48	25	1.9
Diarrhea.....	28	29	9	4.0	24	42	11	4.1	45	59	27	2.6	16	32	5	3.4	22	40	9	1.9
Erysipelas.....	21	63	12	3.8	18	35	6	4.7	35	45	15	3.0	41	74	30	3.9	40	46	13	2.2
Fever, intermittent.....	0	0	0	0	39	88	34	2.8	25	46	6	2.9	16	9	7	3.0	46	59	26	2.2
Fever, remittent.....	3	33	19	2.1	45	80	38	3.9	15	45	12	2.4	3	25	1	3.0	6	64	4	1.4
Fever, typhoid (enteric).....	24	65	19	2.0	27	52	14	5.7	15	46	6	2.4	16	50	7	2.4	56	75	42	1.6
Fever, typho-malarial.....	0	0	0	0	18	28	5	5.1	53	82	43	1.6	47	92	46	1.9	38	69	25	2.6
Influenza.....	48	65	33	1.9	65	78	52	1.8	33	82	3	2.3	38	100	41	3.7	69	66	49	2.4
Kidney, inflammation of.....	21	64	13	4.5	37	39	16	4.6	13	50	6	2.3	33	83	8	2.5	11	60	23	2.6
Measles.....	7	57	4	1.0	29	59	16	3.3	58	61	31	2.5	56	91	53	2.1	27	73	43	3.0
Neuralgia.....	55	70	42	2.6	69	81	56	2.5	52	81	19	3.4	38	81	34	4.3	43	49	16	2.9
Neuritis.....	14	42	5	1.8	29	54	24	3.6	44	30	8	4.5	28	59	18	3.0	32	47	16	3.0
Pneumonia.....	3	30	25	1.6	43	66	42	3.0	24	44	69	2.3	66	83	57	2.4	77	60	8	1.5
Puerperal fever.....	41	80	25	3.1	78	66	50	3.2	93	74	22	1.5	8	77	8	0	13	60	8	2.1
Rheumatism.....	31	74	27	2.6	4	25	1	9.0	4	22	1	0	0	0	0	0	70	57	40	0
Scarlatina.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smallpox.....	69	62	47	2.3	73	69	52	3.1	71	56	39	2.4	56	57	34	0	70	57	40	2.4
Stomatitis.....	10	36	4	2.3	6	80	4	3.3	15	38	5	2.6	19	77	16	2.0	14	58	8	2.5
Whooping-cough.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

b, c, d, e. See foot-notes with these marks in Table 2.

* For counties in each division see Exhibit I.

TABLE 4.—CONCLUDED.

Diseases.	Northern Central Division.*					Bay and Eastern Division.*					Central Division *					Southwestern Div.*					Southern Central Division.*					Southeastern Div.*					
	Per Cent of Observers Reporting Presence of, b	Av. Per Cent of Weeks Reported Present where Present, c	Ing Presence of, d	Av. Order of Prevalence where Present, e		Per Cent of Observers Reporting Presence of, b	Av. Per Cent of Weeks Reported Present where Present, c	Ing Presence of, d	Av. Order of Prevalence where Present, e		Per Cent of Observers Reporting Presence of, b	Av. Per Cent of Weeks Reported Present where Present, c	Ing Presence of, d	Av. Order of Prevalence where Present, e		Per Cent of Observers Reporting Presence of, b	Av. Per Cent of Weeks Reported Present where Present, c	Ing Presence of, d	Av. Order of Prevalence where Present, e		Per Cent of Observers Reporting Presence of, b	Av. Per Cent of Weeks Reported Present where Present, c	Ing Presence of, d	Av. Order of Prevalence where Present, e		Per Cent of Observers Reporting Presence of, b	Av. Per Cent of Weeks Reported Present where Present, c	Ing Presence of, d	Av. Order of Prevalence where Present, e		
Av. for Tab. Dis. Rep. Present..	26	59	15	2.5		25	59	15	2.4		29	63	18	2.7		32	64	21	2.8		28	64	18	3.1		25	59	15	2.3		
Brain, inflammation of.....	7	43	3	3.5		5	23	1	1.6		7	38	3	3.4		13	37	4	4.5		7	33	2	6.0		2	29	1	2.5		
Bowels, inflammation of.....	19	33	6	2.2		16	30	5	2.8		21	44	9	3.3		34	47	16	4.2		22	46	10	4.2		15	36	5	2.5		
Bronchitis.....	81	60	49	1.9		59	70	41	2.2		76	74	56	2.3		65	64	43	2.6		59	77	44	2.6		79	73	51	2.0		
Cerebro-spinal meningitis.....	0	0	0	2.5		6	33	2	2.8		25	25	0.4	2.0		8	25	3	2.6		3	32	1	6.3		4	54	2	4.3		
Cholera infantum.....	7	33	3	3.0		23	46	11	2.0		13	45	9	2.9		27	60	18	2.9		32	48	19	3.5		20	28	1	2.3		
Cholera morbus.....	7	33	3	2.7		31	53	23	2.7		20	45	6	2.9		54	54	15	3.3		36	51	10	3.3		33	33	6	1.6		
Consumption, pulmonary.....	22	64	15	2.7		23	74	23	2.7		37	85	32	2.7		24	78	18	2.7		22	50	1	4.7		30	65	20	2.5		
Croup, membranous.....	4	33	1	3.0		1	25	0.3	2.0		2	55	2	4.8		0	0	0	2.1		2	50	1	4.7		6	22	1	1.5		
Diphtheria.....	4	33	1	2.0		2	34	2	3.1		3	45	2	4.8		3	38	1	2.7		12	55	1	4.7		9	22	1	1.7		
Dysentery.....	33	57	19	2.6		21	55	12	3.1		61	58	36	2.2		57	65	39	2.9		37	62	36	2.9		52	63	33	2.0		
Erysipelas.....	22	80	19	2.5		18	51	10	2.7		33	46	11	2.8		31	47	16	3.8		35	45	9	4.0		27	38	3	2.3		
Fever, intermittent.....	26	42	20	3.6		14	34	5	2.8		29	42	13	3.8		48	50	24	3.7		35	45	9	4.0		27	38	3	2.3		
Fever, remittent.....	33	64	21	2.6		14	36	8	2.6		24	48	12	3.0		52	74	41	2.6		42	68	29	3.8		37	57	16	1.9		
Fever, typhoid (enteric).....	30	80	22	2.4		17	48	8	2.4		37	52	7	3.7		73	36	36	2.4		20	63	10	3.8		31	36	6	1.7		
Fever, typho-malarial.....	22	48	11	3.7		22	79	17	3.2		16	39	2	3.4		4	55	4	2.8		16	64	10	3.8		26	90	13	2.2		
Influenza.....	0	0	0	0		4	28	1	1.0		7	52	9	3.4		7	63	1	2.0		6	72	38	1	3.8		25	60	0.3	1.0	
Kidney, inflammation of.....	67	64	42	2.4		62	61	38	1.7		64	73	46	1.7		2	84	50	2.0		51	72	38	1.9		65	80	52	3.1		
Measles.....	22	48	10	3.2		41	66	6	2.8		39	52	15	3.6		62	84	13	4.7		31	71	38	1.9		65	80	52	3.1		
Mumps.....	19	33	6	2.4		15	60	9	3.2		29	52	15	3.6		27	49	13	4.7		19	71	38	1.9		65	80	52	3.1		
Neuritis.....	78	65	51	2.3		58	66	39	1.9		84	74	62	2.4		76	57	57	2.4		19	71	38	1.9		65	80	52	3.1		
Pneumonia.....	19	33	6	2.6		35	57	20	2.6		33	44	14	3.0		40	54	21	3.3		28	51	14	3.8		36	44	30	2.3		
Puerperal fever.....	30	52	14	2.6		36	52	19	2.8		36	51	18	3.0		38	55	21	3.6		30	48	15	3.7		35	43	33	2.6		
Rheumatism.....	71	23	3	2.3		11	28	3	2.3		3	28	1	2.4		9	27	75	2.5		3	38	38	1	3.2		67	57	4	2.0	
Rheumatoid fever.....	74	72	55	2.0		63	70	44	2.7		82	81	67	2.8		91	81	75	2.3		83	75	65	2.1		12	57	0	3.1		
Scarlatina.....	0	0	0	0		16	59	9	2.7		16	59	9	2.7		16	52	9	1.9		0	59	9	4.5		12	57	0	3.1		
Small-pox.....	0	0	0	0		4	73	3	6.8		75	1	3.5	1		32	9	0	1.9		0	59	9	4.5		12	57	0	3.1		
Tonsillitis.....	63	55	36	2.6		71	43	24	2.4		76	64	49	2.1		67	72	48	1.3		66	71	47	2.7		71	69	9	2.4		
Whooping-cough.....	15	33	5	2.8		11	47	6	4.0		13	53	6	2.1		19	58	12	1.3		7	59	4	3.3		12	69	9	1.6		

b, c, d, e. See foot-notes with these marks in Table 2.

* For counties in each division see Exhibit I.

DISEASES IN MICHIGAN, ARRANGED IN ORDER OF PREVALENCE, THOSE WHICH CAUSED MOST SICKNESS FIRST.

EXHIBIT A.—*Order of Prevalence of twenty-eight diseases in Michigan, in the period of thirteen years, 1884-1896, and in each of those years, and the average for the twelve years, 1884-1895, judging from the "Per Cent of Reports," which stated the presence of each of the diseases, in connection with the reported "Order of Prevalence" when and where each disease was present. (The method of rating diseases for this Exhibit is described and illustrated in a "Compiling Table" on pages 122 and 123 of the Annual Report for 1890.)*

Order, 1884-95.	Diseases arranged in order of greatest prevalence.	Average, Order, 1884-95.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
1	Rheumatism.....	2	1	3	1	1	2	2	1	1	1	1	1	3	2
2	Neuralgia.....	2	2	1	2	2	1	3	2	2	2	2	2	1	1
3	Bronchitis.....	3	4	4	3	4	3	4	3	3	3	3	3	4	4
4	Diarrhea.....	6	6	5	5	6	5	5	5	4	6	6	7	7	6
5	Influenza.....	6	3	2	4	3	4	1	4	8	8	8	8	8	9
6	Intermittent fever.....	6	8	7	8	7	7	8	8	5	4	5	4	2	3
7	Tonsillitis.....	6	5	6	6	5	6	6	7	7	7	7	6	6	7
8	Consumption, pul.....	6	7	10	7	8	9	7	6	6	5	4	5	5	5
9	Remittent fever.....	9	9	9	9	9	8	9	9	9	9	9	9	9	8
(10)	(The Average Disease) ..	10	7	8	9	10	9	10	9	10	11	11	10	10	10
10	Pneumonia.....	12	10	16	16	12	11	13	10	10	10	10	10	10	10
11	Whooping-cough.....	13	11	8	10	11	10	10	13	11	20	19	12	13	13
12	Cholera morbus.....	13	12	11	12	13	14	12	12	15	15	12	14	15	15
13	Inflam. of kidney.....	14	16	14	17	16	12	14	15	14	16	15	13	12	11
14	Dysentery.....	15	13	13	13	17	17	17	14	13	13	13	15	19	14
15	Erysipelas.....	16	20	23	21	21	21	19	15	12	11	11	11	11	12
16	Cholera infantum.....	16	17	12	15	15	15	15	17	18	18	18	17	18	18
17	Measles.....	16	14	18	11	10	16	11	11	22	12	16	22	25	23
18	Typho-mal. fever.....	18	21	20	23	22	22	20	19	17	14	14	16	14	17
19	Pleuritis*.....	19	15	21	22	20	19	18	18	16	17				
20	Typhoid fever (ent.)....	19	19	17	18	14	20	16	20	20	21	21	21	21	22
21	Scarlet fever.....	19	18	19	14	19	13	22	22	21	22	22	20	20	19
22	Inflam. of bowels.....	20	22	22	20	23	23	21	21	19	19	17	18	17	21
23	Diphtheria.....	21	24	27	19	18	18	23	23	24	23	20	19	16	20
24	Puerperal fever.....	23	23	24	24	24	26	25	24	23	24	23	24	24	16
25	Inflam. of brain.....	25	27	26	28	26	25	26	27	27	27	24	23	22	24
26	Membranous croup.....	26	26	28	27	25	27	24	25	26	26	25	25	23	26
27	Cerebro-spi. men.....	26	25	25	25	27	24	27	28	25	25	26	26	26	25
28	Small-pox.....	26	28	15	26	28	28	28	28	28	28	27	27	27	27

* Pleuritis was not compiled until 1888.

DISEASES WHICH CAUSE MOST SICKNESS IN MICHIGAN.

This is shown in this Report in Exhibit A, and more specifically in Exhibit VI., in this Report, and in similar exhibits in previous Reports. The question is differently answered in different years. For many years after the compilation of weekly reports was begun, intermittent fever appeared to be the leading cause of sickness in Michigan.

By Exhibit A, one may see that in the years 1884-5 neuralgia, in the years 1886-90 rheumatism, in 1891 influenza, in 1892 neuralgia, in 1893-94 rheumatism, in 1895 neuralgia, and in 1896 rheumatism appeared to have caused most sickness in Michigan. This does not necessarily imply that there was an increase in rheumatism or neuralgia, because one disease *may* exhibit a higher relative order of prevalence on account of some other disease or diseases having been actually lessened in prevalence.

The "Average Disease" of those reported, is included in Exhibit A, as a standard by which to judge the fluctuations. It may be seen that in 1890, the "Average Disease" was higher (9) by one-tenth, than the average (10) of a long series of years; in 1891 it was lowered to the average; in 1892 it was again higher by one-tenth than the average; in 1893 it was again lowered to the average; in 1894 it was again one-tenth higher; in 1895 it was two-tenths higher, and in 1896 it was three-tenths higher than the average.

In this connection it should be stated that the average number of diseases reported on each card has gradually decreased for the past twelve years. This is shown in Exhibit B, as follows:—

EXHIBIT B.—*Stating for each of the thirteen years, 1884-96, the number of card reports received, the total number of disease reports and the average number of diseases reported on each card; also the averages for the 12 years, 1884-95.*

Year.	Number of card reports received.	Number of disease reports.	Av. number of diseases on each card.
1884.....	3,957	31,466	7.91
1885.....	5,103	35,752	7.00
1886.....	5,583	38,640	6.92
1887.....	4,896	33,048	6.75
1888.....	5,047	33,270	6.59
1889.....	5,000	32,612	6.52
1890.....	4,939	33,934	6.87
1891.....	4,291	28,741	6.70
1892.....	5,281	31,269	5.92
1893.....	5,853	32,723	5.59
1894.....	5,572	30,619	5.50
1895.....	4,394	24,004	5.46
Av. for the 12 years, 1884-95.....	4,923	32,173	6.48
1896.....	3,940	19,443	4.93

In 1890 rheumatism, neuralgia, bronchitis and influenza in order named headed the list. In 1891 influenza, rheumatism, neuralgia and bronchitis headed the list. In 1892 neuralgia, rheumatism, bronchitis and influenza headed the list. In 1893 rheumatism, neuralgia, influenza and bronchitis, in 1894 rheumatism, neuralgia, bronchitis and influenza, in 1895 neuralgia, influenza, rheumatism and bronchitis, and in 1896 rheumatism, neuralgia, influenza and bronchitis, in order named, appear to have caused most sickness in Michigan.

Nearly the same diseases appear above the average line each year. Pneumonia has appeared tenth in order for eleven years in succession, ending with 1890, and dropped to thirteenth in 1891, rising in 1892 to eleventh and dropped in 1893 to twelfth and in 1894-1895 to sixteenth, rising again in 1896 to tenth, in order. Some of the diseases of minor importance vary considerably in their order. Whooping-cough, for example, in 1883 was nineteenth in order, and rose to twelfth in order in 1886, dropped to nineteenth in 1887, to twentieth in 1888, and rose to eleventh in 1889, dropped to thirteenth in 1890, and rose to tenth in 1891 and 1892, dropped to eleventh in 1893 and rose to tenth in 1894 and eighth in 1895, and dropped again in 1896 to eleventh, in order.

Exhibit VII. supplies data relative to what diseases caused most sickness in 1896 in each of the several geographical divisions of Michigan. It may be seen that there is evidence that there are very great differences in the different parts of the State. Further evidence is very desirable, however, in order to reach conclusions on this important subject. The exhibit will be found of great interest to those who study it carefully, and in connection with previous reports.

The lines for 1896 in Exhibit XIII., are graphically represented in Diagrams 1, 2, 3 and 4 of this article.

EXHIBIT VI.—*Diseases from which there seems to have been the Most Sickness in Michigan in 1896, as indicated by the Per Cent of Weekly Reports Stating Presence of the Diseases, as studied in connection with the Average Order of Prevalence of said Diseases when Reported Present; also Order, Per Cent of Reports and Average Order for the same Diseases in 1895, 1894, 1893 and 1892.*

1896.				1895.				1894.				1893.				1892.			
More sickness than Av. for 25 Diseases.		Order.*	Diseases in Order of Apparent Amount of Sickness in 1896. Most Prevalent Disease First.	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence when Present. e	Order.*	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence when Present. e	Order.*	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence when Present. e	Order.*	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence when Present. e	Order.*	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence when Present. e		
More sickness than Av. for 25 Diseases.	1	Rheumatism.....	60	2.3	3	60	2.7	1	62	2.6	1	64	2.6	2	64	2.7			
	2	Neuralgia.....	54	2.3	1	56	2.5	2	56	2.5	2	57	2.5	3	61	2.5			
	3	Influenza.....	44	1.8	2	44	2.0	4	41	2.2	3	43	2.0	1	42	2.1			
	4	Bronchitis.....	51	2.4	4	52	2.6	3	50	2.6	4	53	2.5	4	54	2.6			
	5	Tonsillitis.....	45	2.6	6	43	3.0	6	42	3.0	5	49	2.8	6	48	2.9			
	6	Diarrhea.....	34	2.5	5	42	2.5	5	40	2.5	6	40	2.6	5	43	2.6			
Less than said Average.	(7)	Average.....	18	2.7	(8)	20	3.0	(9)	20	3.0	(10)	20	3.3	(10)	21	3.1			
	7	Consumption, pul.....	23	3.0	10	29	3.5	7	36	3.4	8	38	3.5	7	38	3.7			
	8	Intermittent fever.....	19	2.7	7	22	2.9	8	24	2.9	7	24	2.9	8	27	3.0			
	9	Remittent fever.....	16	2.9	9	20	3.1	9	20	3.1	9	18	2.9	9	21	2.9			
	10	Pneumonia.....	18	3.2	16	21	3.7	16	20	3.7	12	22	3.6	11	25	3.7			
	11	Whooping-cough.....	7	2.4	8	9	2.6	10	12	2.9	11	9	3.0	10	10	3.0			
	12	Cholera morbus.....	11	2.9	11	15	3.0	12	14	3.3	13	14	3.3	12	15	3.4			
	13	Dysentery.....	11	3.0	13	15	3.2	13	14	3.3	17	13	3.6	17	15	3.8			
	14	Measles.....	7	2.7	18	4	3.1	11	6	2.8	10	7	2.8	16	4	3.3			
	15	Pleuritis.....	16	3.4	21	17	3.8	22	13	3.8	20	14	3.8	19	18	4.0			

* Judging from the per cent of reports which stated presence of the diseases in connection with the order of prevalence when present. The method of rating diseases, as causes of sickness, as shown in Exhibits VI and VII., is fully described and illustrated by a "Compiling table" on pages 122 and 123 of the Annual Report for the year 1890.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from all observers in the State. It combines and states in a general way, an idea of the time a disease was prevalent, with an idea of the area of its prevalence.

e The disease having the greatest number of cases was to be marked 1, in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals of the Order of Prevalence columns in Table 3 (omitted in this report), by the number of observers who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of observers who reported the different diseases present, thus counting each observer once for every disease he reported present. As a rule, small numbers in this column indicate the large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer, from week to week, the greater will be the average in this column.

EXHIBIT VII.—*In each of Eleven Geographical Divisions* of the State, the Fifteen Diseases from which there seems to have been the Greatest Amount of sickness in 1896, as indicated by the Per Cent of Weekly Reports Stating Presence of each of 28 Leading Diseases, when Studied in connection with the Average Order of Prevalence of said diseases when reported present.*

	Order.†	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports stating Presence of d. Av. Order of Prevalence when Pres. e			Order.†	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports stating Presence of d. Av. Order of Prevalence when Pres. e			Order.†	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports stating Presence of d. Av. Order of Prevalence when Pres. e	
More Sickness than Av. for 28 Diseases.		UPPER PEN'LAR DIV.*					NORTHWESTERN DIV.*					NORTHERN DIVISION.*		
	1	Bronchitis	48	2.1			Influenza	52	1.8			Rheumatism	69	2.3
	2	Tonsillitis	47	2.3			Neuralgia	56	2.5			Bronchitis	66	2.3
	3	Neuralgia	42	2.6			Bronchitis	62	3.2			Influenza	43	1.6
	4	Consumption, pul.	42	2.7			Tonsillitis	52	3.1			Neuralgia	61	2.5
	5	Influenza	33	1.9			Rheumatism	50	3.2			Tonsillitis	39	2.4
	6	Diarrhea	32	2.9			Diarrhea	49	3.1			Diarrhea	32	2.2
	7	Scarlet fever	27	2.6			Intermittent fever ..	34	2.8			Diphtheria	7	1.7
	8	Cholera infantum	13	1.4			Remittent fever	38	3.9			Scarlet fever	1	1.5
	9	Typhoid fever (ent.) ..	19	2.1			Consumption, pul.	30	4.2			Cholera morbus	7	2.1
	10	Rheumatism	25	3.1			Pneumonia	24	3.6			Dysentery	17	2.6
	(11)	.....	.....	.....			Average	21	3.6			Average	19	2.7
	11	Cho'era morbus	10	1.6			Measles	16	3.3			Remittent fever	12	2.4
	12	Measles	4	1.0			Pleuritis	15	3.3			Erysipelas	27	3.2
	(13)	Average	15	2.6			.....	.....	.....			.....	.....	.....
Less than said Average.	13	Inflam. of bowels	12	2.4			Cholera infantum	7	3.0			Pleuritis	31	3.4
	14	Pneumonia	7	2.0			Cholera morbus	15	4.4			Measles	6	2.3
	15	Plenritis	5	1.8			Dysentery	11	4.1			Pneumonia	19	3.0
	(14)	.....	.....	.....			.....	.....	.....			.....	.....	.....
		NORTHERN CEN. DIV.*					WESTERN DIVISION.*					NORTHEASTERN DIV.*		
	1	Rheumatism	55	2.0			Rheumatism	60	2.1			Neuralgia	53	2.1
	2	Bronchitis	49	1.9			Influenza	42	1.6			Bronchitis	62	2.5
	3	Neuralgia	51	2.3			Neuralgia	49	2.4			Influenza	46	1.9
	4	Influenza	42	2.4			Bronchitis	45	2.6			Rheumatism	57	2.4
	5	Tonsillitis	36	2.6			Tonsillitis	40	2.4			Diarrhea	45	3.0
	6	Remittent fever	22	2.4			Scarlet fever	8	1.5			Whooping-cough	16	2.0
	7	Dysentery	19	2.5			Typho-mal. fever	5	1.4			Scarlet fever	8	2.0
	8	Diphtheria	3	2.0			Remittent fever	26	2.4			Cholera infantum	6	2.0
	9	Intermittent fever	21	2.6			Inflam. of kidney	25	2.4			Diphtheria	1	2.0
	10	Diarrhea	19	2.6			Intermittent fever ..	20	2.2			Typho-mal. fever	7	2.3
	(11)	Average	15	2.5			.....	.....	.....			.....	.....	.....
Less than said Average.	11	Inflam. of bowels	6	2.2			Diarrhea	25	2.5			Inflam. of kidney	41	3.7
	12	Pneumonia	14	2.6			Dysentery	9	1.9			Typhoid fever (ent.) ..	7	2.4
	13	Measles	6	2.4			Erysipelas	13	2.2			Measles	8	2.5
	(14)	.....	.....	.....			Average	17	2.4			.....	.....	.....
	14	Puerperal fever	3	2.3			Consumption, pul.	17	2.6			Consumption, pul.	20	3.0
	15	Consumption, pul.	15	2.7			Inflam. of bowels	11	2.4			Cholera morbus	4	2.5
	(17)	.....	.....	.....			.....	.....	.....			Average	19	3.0

*. † Foot-notes with these marks on opposite page. d, e. Foot-notes with these marks are on page 103.

EXHIBIT VII.—CONCLUDED.

	Order.†	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.		Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.		Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	
		Per Cent of Reports stating Presence of d	Av. Order of Prevalence when Pres.e	Per Cent of Reports stating Presence of d	Av. Order of Prevalence when Pres.e	Per Cent of Reports stating Presence of d	Av. Order of Prevalence when Pres.e
More Sicknes than Av. for 25 Diseases.		BAY AND EASTERN DIV.*		CENTRAL DIVISION.*		SOUTHWESTERN DIV.*	
	1	Rheumatism.....	44 2.3	Rheumatism.....	67 2.4	Rheumatism.....	75 2.3
	2	Influenza.....	38 1.7	Neuralgia.....	62 2.4	Influenza.....	50 2.0
	3	Tonsillitis.....	43 2.4	Influenza.....	46 1.7	Neuralgia.....	57 2.4
	4	Neuralgia.....	39 1.9	Bronchitis.....	56 2.3	Tonsillitis.....	43 2.4
	5	Bronchitis.....	41 2.2	Tonsillitis.....	49 2.7	Bronchitis.....	43 2.6
	6	Diarrhea.....	25 1.6	Diarrhea.....	36 2.2	Intermittent fever..	41 2.6
	7	Consumption, pul..	23 2.7	Consumption, pul..	32 2.9	Whooping-cough...	12 1.3
	(8)	.....	.....	Average.....	18 2.7	.....	.....
	8	Remittent fever....	8 1.3	Whooping-cough...	6 2.1	Diarrhea.....	39 2.7
	9	Pneumonia.....	19 2.8	Pneumonia.....	18 3.0	Scarlet fever.....	9 1.9
	(10)	Average.....	15 2.4	.....	.....	.....	.....
	10	Cholera infantum...	10 2.0	Cerebro-spi. men...	0.4 2.0	Remittent fever....	36 3.2
	(11)	.....	.....	.....	.....	Average.....	21 2.8
	11	Typho-mal. fever....	1 1.0	Intermittent fever...	12 2.7	Consumption, pul..	18 2.7
Less.	12	Typhoid fev. (ent.)	17 3.2	Remittent fever....	16 3.0	Typho-mal. fever...	1 2.0
	13	Pleuritis.....	20 3.6	Dysentery.....	11 2.8	Cholera infantum...	18 2.9
	14	Cholera morbus.....	11 2.7	Cholera morbus.....	9 2.9	Dysentery.....	16 2.9
	15	Dysentery.....	10 2.7	Measles.....	5 2.7	Pleuritis.....	21 3.3
		SOUTH'N CENTRAL DIV.*		SOUTHEASTERN DIVISION.*			
	1	Rheumatism.....	65 2.1	Influenza.....	.....	.....	52 1.5
	2	Neuralgia.....	61 2.3	Bronchitis.....	.....	.....	57 2.0
	3	Influenza.....	38 1.9	Rheumatism.....	.....	.....	44 2.6
	4	Tonsillitis.....	47 2.7	Diarrhea.....	.....	.....	33 2.0
	5	Bronchitis.....	44 2.6	Neuralgia.....	.....	.....	38 2.3
	6	Diarrhea.....	35 2.9	Tonsillitis.....	.....	.....	38 2.4
	7	Intermittent fever..	29 3.0	Intermittent fever...	.....	.....	16 1.9
	(8)	Average.....	18 3.1	.....	.....	.....	.....
	8	Measles.....	6 2.4	Typho-malarial fever...	.....	.....	03 1.0
	9	Cholera morbus.....	19 3.3	Whooping-cough.....	.....	.....	9 1.6
	10	Consumption, pul..	18 3.7	Remittent fever.....	.....	.....	8 1.7
	11	Pneumonia.....	15 3.7	Cholera morbus.....	.....	.....	6 1.6
	12	Inflam. of kidney...	16 3.8	Typhoid fever (enteric).....	.....	.....	15 2.2
	(13)	.....	.....	Average.....	.....	.....	15 2.3
Less.	13	Cholera infantum...	10 3.5	Consumption, pulmonary.....	.....	.....	20 2.6
	14	Pleuritis.....	14 3.8	Membranous croup.....	.....	.....	1 1.5
	15	Dysentery.....	11 3.7	Diphtheria.....	.....	.....	4 1.7

* The counties in each division are stated in Exhibit I.

† Judging from the per cent of reports in connection with the "average order of prevalence where present."

d, e. Foot-notes with these marks are on page 103.

EXHIBIT VIII.—*Names of Stations where were made the Observations of Meteorological Conditions used in Exhibit X., and following Exhibits; relative to Sickness and Meteorological Conditions in 1896, also the Temperature, Humidity, Cloudiness, Ozone, Velocity of Wind and Atmospheric Pressure, at each Station for which Observations of the given condition are included in the summary statement relative to that condition in said exhibit.*

Stations.* (Those of the U. S. Weather Bureau in Italics.)	Temperature.		Humidity.		Per Cent of Cloudiness.	Ozone.		Wind, Av. Velocity.	Atmospheric Pressure.		
	Average Daily Range.	Average.	Relative.	Absolute.		Day.	Night.		Range.		Average.
									Monthly.	Average Daily.	
Number of Stations in- cluded in Average..... }	16	10	8	8	10	9	9	7	9	9	9
Average.....	17.48	47.89	77	3.65	56	3.71	4.16	9.8	.884	.206	29.137
Rockland.....	20.72	-----	-----	-----	55	5.77	6.31	-----	-----	-----	-----
Marquette.....	15.35	-----	-----	-----	-----	-----	-----	10.2	-----	-----	-----
Sault Ste. Marie.....	17.13	-----	-----	-----	-----	-----	-----	8.6	-----	-----	-----
Traverse City.....	19.93	46.38	81	3.54	60	6.56	6.67	-----	.909	.209	29.317
Alpena.....	14.77	-----	-----	-----	-----	-----	-----	9.6	-----	-----	-----
Harrisville.....	18.90	43.77	67	3.04	67	2.68	3.00	-----	.929	.211	29.332
Grand Haven.....	15.65	-----	-----	-----	-----	-----	-----	10.4	-----	-----	-----
Port Huron.....	14.78	-----	-----	-----	-----	-----	-----	11.4	-----	-----	-----
Thornville.....	15.23	48.95	77	3.69	49	4.20	5.57	-----	.922	.211	28.986
Agricultural College.....	21.94	47.99	90	4.29	56	-----	-----	-----	.737	.208	29.047
Lausling, S. B. of H.....	18.70	48.31	72	3.48	60	2.17	2.65	9.9	.869	.202	29.086
Adrian.....	18.19	48.63	-----	-----	-----	2.52	3.00	-----	.882	.199	29.148
Ann Arbor.....	17.44	48.41	80	3.65	53	2.53	2.38	8.1	.916	.207	29.044
Battle Creek.....	-----	49.62	-----	-----	55	2.61	2.60	-----	-----	-----	-----
Tecumseh.....	17.44	47.87	75	3.65	49	4.33	5.23	-----	.874	.188	29.161
Birmingham.....	18.56	49.01	78	3.89	60	-----	-----	-----	.918	.219	29.108
Detroit.....	14.87	-----	-----	-----	-----	-----	-----	10.2	-----	-----	-----

* Observations of range of temperature were made with registering thermometers read and set at the Stations of the U. S. Weather Bureau as follows:—the maximum at the morning observation, the minimum at the evening observation, at 9 P. M. at Ann Arbor, and at 7 A. M. at other stations. For the ozone observations, the test-paper was exposed from 7 A. M. to 2 P. M. for the day observations, and from 9 P. M. to 7 A. M. for the night observations. The velocity of wind was recorded by registering anemometers. These subjects are treated by months in 1896 and for previous years, in an article on Meteorological Conditions in Michigan in 1896, on pages 1-82 of this Report.

EXHIBIT IX.—Showing Comparisons between the Averages of certain Meteorological Conditions at the Stations in Michigan in 1896, with those in preceding Years. (Abstracted from Exhibits 9, 13, 17, 19, 28, 24, 25, 30, 31, 32 and 35, pages 1 to 82 of this Report.)

Meteorological Conditions.	Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average Temperature	1.64	3.65	1.34		6.76	8.87	1.65	.26	1.49			2.66	1.19
In 1896 higher than Av. for 19 years, 1877-95.													
Lower				1.72						2.99	3.43		
Av. Daily Range of Temp.													
In 1896 greater than Av. for 17 years, 1879-95.					.23	1.54	.59				1.09	.54	
Less	.59	4.24	1.67	.96				1.68	.56	1.90			.10
Absolute Humidity	.21	.10			.90	1.09	.11	.41	.67			.29	
In 1896 more than Av. for 19 years, 1877-95.													
Less			.03	.27						.27	.43		.06
Relative Humidity	1	0			3	2		5	5	5	0	1	
In 1896 more than Av. for 18 years, 1878-95.													
Less		0	4	3			1				0		1
Rainfall	2.01	.64	1.11	.90	.37			1.32	.94	1.84		.26	
In 1896 more than Av. for 19 years, 1877-95.						.46	.58				1.30		1.79
Less	.1		1.0	1.3	.8	.8			.4	.4		1.5	
Velocity of Wind		1.0					.5	.3			.7		2.0
In 1896 more than Av. for 14 years, 1882-95.													
Less													
Cloudiness	1	9	1		0			8		17		8	
In 1896 more than Av. for 19 years, 1877-95.				5	0	9	8		1		7		3
Less													
Day Ozone	.25	.25	.35	.41	.47	.12	.20	0	.60		.12	.24	.31
In 1896 more than Av. for 19 years, 1877-95.								0		.01			
Less													
Night Ozone	.53	.08	.33	.39	.49	.61	.76	.59	1.18	.56	.14	.50	.43
In 1896 more than Av. for 19 years, 1877-95.													
Less													
Atmospheric Pressure.	.001	.056		.017	.041		.003	.019	.016			.025	.066
In 1896 more than Av. for 19 years, 1877-95.			.185			.017					.001		
Less						.017							

CLIMATE AND SICKNESS.*

Exhibit X. (and similar exhibits in previous Reports) is an attempt to learn something of the relations of bronchitis to meteorological conditions, by noting whether each meteorological condition was above or below its average for the year, in months when more or in months when less bronchitis than the average for the year was reported. The months are arranged in order according to the prevalence of bronchitis; those months in which most bronchitis was reported being placed first in the column; those in which more bronchitis than the average was reported are placed above the average line, the others below that line. The meteorological conditions for each month are printed, in the proper columns, in the line for the month. The statements being thus arranged, it is easy to see whether the temperature, the velocity of the wind, or any other condition represented, was above its annual average in months when more than the average amount of bronchitis was reported, or *vice versa*.

That the comparisons may the more readily be held in mind, propositions have been made concerning the relations of bronchitis to meteorological conditions, grouping the conditions into two classes. The letters *a* and *b* in the exhibit mark exceptions to these propositions. It is not supposed that the propositions are in every case true concerning every disease; but the propositions serve to bring out the evidence of the exhibit on the subject in question. This evidence is appreciated by noting the number and force of the exceptions to the propositions, and also whether the exception is explained by facts shown in other columns. A summary of the evidence is presented in Exhibit XXV., near the close of this article.

Exhibits and propositions similar to those relative to bronchitis, but relating to other diseases, are given on following pages. The propositions are differently stated for the summer diseases (beginning with the exhibit on diarrhea) and for the winter diseases (beginning with that on bronchitis), but they are not changed to fit the individual diseases under each class.

Relations of Bronchitis to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis, these conditions were **less** than the average for the year. In Exhibit X., the letter *a* marks exceptions to this proposition for the year 1896.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, the average daily temperature, the average daily range of temperature†, the absolute humidity of the atmosphere and the average daily pressure of the atmosphere‡ were **less** than the average for the year; and in months

* The remarks under this head are applicab'e, also, by changing the name of the diseases to diseases treated in Exhibits XII., XIV., XV., XVI. and XVII., on the following pages. The meteorological data are from places indicated in Exhibit VIII.

† The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893, Annual Report for 1894.

when **less** than the average per cent of reports stated the presence of bronchitis these conditions were **greater** than the average for the year. In Exhibit X., the letter *b* marks exceptions to this proposition for months in 1896.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 2, it is true also that the quantity of vapor inhaled daily was **less** than the average, and the quantity exhaled daily in excess of that inhaled was **greater** than the average in months when **more** than the average per cent of reports stated presence of bronchitis; and that **more** vapor was inhaled and a **less** excess exhaled daily in months when the per cent of reports stating presence of bronchitis was **less** than the average.

Proposition 3 also holds true in relation to pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis and pulmonary consumption, treated in Exhibits XII., XIV., XV., XVI. and XVII., on following pages.

What per cent of weekly reports received in 1896 stated presence of bronchitis is graphically represented by months in Diagram 1.

The evidence of Exhibit X. confirms that of similar exhibits relating to bronchitis in previous years.

What per cent of the reports received stated presence of bronchitis by months in each of the years 1877-96; also the averages for 1877-95 and 1886-95, and a comparison of 1896 with those averages, are shown in Exhibit XI.

Relations of Pneumonia and other "Cold Weather" Diseases to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption or average disease), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind and the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of the reports stated the presence of pneumonia (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibits XII.-XXVIII., the letter *a* marks exceptions to this proposition for the year 1896.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption or average disease), the average daily temperature, the average daily range of temperature*, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere*, were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of pneumonia (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibits XII.-XXVIII., the letter *b* marks exceptions to this proposition for the year 1896.

* The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893, Annual Report for 1894.

What per cent of the weekly reports received in 1896 stated presence of pneumonia is graphically represented by months in Diagram 1. What per cent of the weekly reports received stated presence of pneumonia, and of the other diseases mentioned in the two preceding propositions by months in the years 1895 and 1896, is stated in Exhibit XIII., where are also given an average for the nineteen years, 1877-1895, also for the ten years, 1886-1895, and a comparison of 1896 with those averages.

From Exhibit XIII., it may be seen that pneumonia was considerably less in 1896 than the average for nineteen years, 1877-1895, and also less in each month of 1896, than for the corresponding months of the nineteen years, 1877-1895.

The average temperature was slightly higher in 1896, than the average for the nineteen years, 1877-1895. In 1896, it was also higher in the months of January, February, April, May, June, July, August, November and December; and lower in the months of March, September and October.

The absolute humidity was slightly more in 1896 than the average for the nineteen years, 1877-1895. In 1896, it was more in the months of January, April, May, June, July, August and November; and less in the months of February, March, September, October and December; than the average in the corresponding months in the nineteen years, 1877-1895.

EXHIBIT XI.—SICKNESS FROM BRONCHITIS, 1877-96.—*By Year and Months for each of the twenty years, 1877-96, and an average for the nineteen years, 1877-95, also for the ten years, 1886-95; Stating on what per cent of the Weekly Reports received Bronchitis was reported present, and comparing the Per Cent of 1896, with the Averages for corresponding months in those Years.*

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average, 19 years, 1877-95.....	59	73	74	73	69	60	51	42	40	46	54	63	68
Average, 10 years, 1886-95.....	56	69	70	70	67	58	48	40	39	45	53	59	63
1877.....	55	76	72	72	65	45	31	25	22	37	48	71	77
1878.....	64	77	75	74	71	65	56	41	45	55	60	73	81
1879.....	64	83	87	83	78	65	54	40	41	55	59	65	77
1880.....	64	81	84	82	68	59	57	44	45	46	57	67	72
1881.....	62	86	86	80	78	62	53	38	37	44	44	66	68
1882.....	65	73	70	75	74	70	62	51	44	57	59	71	71
1883.....	66	77	80	82	76	70	62	56	53	53	57	61	69
1884.....	61	71	71	71	65	59	56	49	47	50	56	69	70
1885.....	56	73	74	76	73	56	52	44	39	45	51	58	64
1886.....	56	71	69	71	65	57	45	40	37	41	51	61	65
1887.....	55	67	69	67	62	57	49	41	38	47	57	57	61
1888.....	59	63	76	74	68	63	55	41	39	49	59	59	65
1889.....	58	65	68	60	68	61	50	49	44	51	57	64	62
1890.....	65	71	74	76	74	66	56	50	52	54	65	73	79
1891.....	60	81	79	81	76	64	48	43	36	44	48	57	68
1892.....	54	72	70	64	67	56	47	37	38	42	50	57	63
1893.....	53	67	67	62	64	54	42	35	34	39	48	61	62
1894.....	50	63	60	61	58	49	42	32	36	43	52	53	57
1895.....	52	66	71	70	66	56	47	34	34	35	44	52	52
1896.....	51	59	60	59	53	45	39	36	35	46	53	59	61
In 1896 Less than Average 1877-95.....	8	14	14	14	13	15	12	6	5	=	1	4	7
In 1896 Greater than Average 1886-95*.....	—	—	—	—	—	—	—	—	—	1	=	=	—
In 1896 Less than Average 1886-95*.....	5	10	10	11	11	13	9	4	4	—	—	—	2

* This comparison is made because of change of plan of reports in May, 1885, as explained on page 84.

The relative humidity was slightly more in 1896, than the average for the eighteen years, 1878-1895. In 1896, it was more in the months of April, May, July, August, September and November; and less in the months of

February, March, June and December; than the average in the corresponding months in the eighteen years, 1878-1895. In January and October it was the same.

EXHIBIT X.—BRONCHITIS.—*Statement for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Bronchitis and what were the Meteorological Conditions as observed at Stations in Michigan.**

BRONCHITIS.			Tempera- ture, F.		Humidity of Air. Av. of Daily Ob- servations		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		per Hour by Anemometer.		Atmospheric Pres- sure, Inches Reduced to 32° F.			
Months in Order of Great- est Per Cent. of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present.†.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.		Inhaled. ||	Exhaled in ex- cess of that inhaled. ¶	Average Per Cent of Cloudiness.	Ozone, Relative, 7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.
						Absolute — Grains of Vapor in a Cu- bic Foot of Air.				Day Observation, 7 A. M. to 2 P. M.				Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions.**	
More than Av. Per Cent of Bronchitis.	Dec.	61	2.2	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.981	.235	b 29.214
	Feb.	60	2.6	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Jan.	59	2.3	11.49	24.88	83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
	Mar.	59	2.6	16.48	28.11	a 76	1.56	.98	10.70	a 52	4.20	4.64	12.0	1.075	.286	b 29.149
	Nov.	59	2.2	14.64	38.70	81	2.60	1.63	10.05	77	3.45	3.95	12.3	1.012	.254	b 29.175
	Apr.	56	2.3	b 19.89	b 51.33	a 74	b 3.69	2.31	9.37	a 52	4.07	4.48	11.2	.901	a .176	b 29.161
	Oct.	53	2.2	b 18.28	45.80	a 76	3.06	1.91	9.77	a 50	a 3.29	a 3.43	a 9.0	a .815	a .131	b 29.153
	Av.	51	2.4	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Bronchitis.	Sept. ...	46	2.4	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129
	May	45	2.2	21.82	64.77	72	5.03	3.14	8.54	41	a 3.83	a 4.53	a 10.3	.804	.186	b 29.078
	June	39	2.5	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
	July	36	2.6	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
	Aug.	35	3.0	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152

a An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological conditions named at the head of the column was greater than the average for the year; and less in months when the same condition was less than the average. See proposition 1, relating to bronchitis, page 122.

b An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was less than the average for the year and less in months when the same condition was greater than the average for the year. See proposition 2, relating to bronchitis, page 122.

* How many stations, and what stations are represented in the statements for each meteorological subject may be seen by referring to Exhibit VIII., in which the stations are named, and a statement for the year 1896, in relation to each meteorological subject, is given for each station included in the average for that subject. In Exhibit VIII., is also stated what time the tri-daily observations were made at each station. Additional statements relative to meteorological conditions may be found in an article on the Principal Meteorological Conditions in Michigan in 1896, on pages 1-82 of this Report.

† Explanations of statements in these columns, and other statements relative to the prevalence, in 1896, of the diseases under consideration may be found in Tables 2 and 4 of this article, and also in Diagrams 1, 2, 3, 4 and 5. When the per cent of reports stated for any disease is the same for two months or for any month is the same as the average, the order of months in the first column of these exhibits has been determined by reference to fractional per cents.

‡ Small numbers in this column indicate great prevalence in the localities where the disease occurred, as compared with other diseases; and large numbers a less prevalence.

§ Calculated from readings of dry bulb and wet bulb thermometers.

¶ Calculated for 18 respirations per minute, of 20 cubic inches of air each.

|| Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which case each cubic foot of air contains 18.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.63 Troy ounces of vapor exhaled daily. No correction has been made for the expansion of air after it is inhaled.

** The daily range from which numbers in this column were computed is the difference between the highest and the lowest of the four observations taken during the 24 hours, namely, at 7 A. M., 2 P. M., 9 P. M. of one day, and 7 A. M. of the following day.

EXHIBIT XII.—PNEUMONIA AND MEMBRANOUS CROUP.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Pneumonia and Membranous Croup and what were the Meteorological Conditions as observed at Stations in Michigan.**

PNEUMONIA.				Temperature, F.		Humidity of Air, ^{32° F.} Av. of 33 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative, Scale of 10°.		Atmospheric Pressure, Inches. Reduced to 32° F.				
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present, †.	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cubic Foot of Air	Inhaled. ||	Exhaled in excess of that Inhaled. §	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.	
													Monthly and for Year.	Av. Daily, by 3 Daily Observations. **		
More than Av. Per Cent of Pneumonia.	Mar.	39	3.6	16.48	28.11	76	1.56	.98	10.70	a 52	4.20	4.64	12.0	.075	.286	b 29.149
	Feb.	30	3.4	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Apr.	26	3.1	b 19.39	b 51.33	a 74	b 3.69	2.31	9.37	a 52	4.07	4.48	11.2	.901	a .176	b 29.161
	Jan.	23	3.7	11.49	24.88	83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
	Dec.	20	3.4	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.981	.235	b 29.214
Av.	18	3.2	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.9	.884	.206	29.137	
Less than Av. Per Cent of Pneumonia.	Nov.	18	3.0	b 14.64	b 38.70	a 81	b 2.60	1.63	10.05	a 77	3.45	3.95	a 12.3	a 1.012	a .254	29.175
	June	13	2.9	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
	Oct.	12	3.0	18.28	b 45.80	76	b 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	May	11	3.3	21.82	64.77	72	5.03	3.14	8.54	41	a 3.83	a 4.53	a 10.3	.804	.186	b 29.078
	July	10	2.9	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
	Aug.	7	2.6	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152
Sept.	7	2.4	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129	
MEMBRANOUS CROUP.																
More than Av. Per Cent of Membranous Croup.	Nov.	2	3.3	14.64	38.70	81	2.60	1.63	10.05	77	a 3.45	a 3.95	12.3	1.012	.254	b 29.175
	Dec.	2	3.3	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.981	.235	b 29.214
	Jan.	2	5.0	11.49	24.88	83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
Av.	1	3.9	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Membranous Croup.	Sept.	1	1.5	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129
	Oct.	1	3.3	18.28	b 45.80	76	b 3.03	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	May	1	5.3	21.82	64.77	72	5.03	3.14	8.54	41	a 3.83	a 4.53	a 10.3	.804	.186	b 29.078
	Feb.	0.7	6.0	b 15.56	b 24.57	a 79	b 1.50	.94	10.74	a 65	a 4.12	a 4.61	a 11.8	a 1.169	a .307	b 28.979
	Mar.	0.3	2.0	b 16.48	b 28.11	76	b 1.56	.98	10.70	52	a 4.20	a 4.64	a 12.0	a 1.075	a .286	29.149
	Apr.	0	0	19.39	51.33	74	3.69	2.31	9.37	52	a 4.07	a 4.48	a 11.2	a .901	.176	29.161
	June	0	0	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
	July	0	0	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
Aug.	0	0	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152	

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Pneumonia and Membranous Croup, on page 123.

b An exception to Proposition 2, relating to Pneumonia and Membranous Croup, on page 123.

DIAGRAM 2—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1896.



EXHIBIT XIII.—By Year and Months for 1896 and for the preceding year, and an Average for the nineteen years, 1877-95;* also for the ten years, 1886-95. Stating on what Per Cent of the Weekly Reports received PNEUMONIA, MEMBRANOUS CROUP, DIPHThERIA, RHEUMATISM, INFLUENZA, SCARLET FEVER, NEURALGIA* AND TONSILLITIS,* were Reported Present, and Comparing the Per Cents for months in 1896, with the Averages for Corresponding Months in those years.†

Years, etc.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Pneumonia.	Av. 19 years, 1877-1895	31	52	55	52	46	34	20	13	11	14	19	29	38	Membranous Croup.	5	9	7	6	5	4	3	2	2	3	4	7	5
	Av. 10 years, 1886-1895	26	45	47	44	38	28	15	10	8	11	15	23	32		3	6	5	4	4	3	2	1	1	2	3	5	5
	1895	21	39	42	45	35	19	8	8	5	4	9	18	22		2	2	3	2	5	1	1	1	1	0	7	1	2
	1896	18	23	30	39	26	11	13	10	7	7	12	18	20		1	2	0	7	0	0	0	0	0	1	1	2	2
	In 1895 Greater than Av. 1877-1895	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Less than Av. 1877-95	13	29	25	13	20	23	7	3	4	7	7	11	18		4	7	6	3	5	3	2	2	2	3	5	5	5
	In 1896 Greater than Av. 1886-1895†	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Less than Av. 1886-95†	8	22	17	5	12	17	2	—	1	4	3	5	12		2	4	4	3	3	7	4	2	1	1	2	3	3
Diphtheria.	Av. 19 years, 1877-1895	15	19	16	14	14	12	11	10	11	12	18	20	19	Rheumatism.	67	71	71	73	74	71	67	61	57	60	66	69	71
	Av. 10 years, 1886-1895	8	10	8	7	7	6	6	6	6	7	10	10	10		66	69	69	72	73	71	66	60	58	60	65	66	68
	1895	5	10	6	5	4	1	4	4	5	4	6	6	5		60	60	64	69	69	66	58	53	53	53	60	61	60
	1896	5	5	5	2	1	3	3	2	3	6	10	12	9		60	62	63	62	67	61	55	54	52	54	60	65	63
	In 1896 Greater than Av. 1877-1895	10	14	11	12	13	9	8	8	6	8	8	10	—		7	9	8	11	7	10	12	7	5	6	6	4	8
	In 1896 Less than Av. 1877-95	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Greater than Av. 1886-1895†	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Less than Av. 1886-95†	3	5	3	5	6	3	3	4	3	1	—	—	1		6	7	6	10	6	10	11	6	6	6	5	1	5
Influenza.	Av. 19 years, 1877-1895	41	62	65	63	55	40	27	19	19	26	32	41	52	Scarlet Fever.	14	18	18	18	18	16	14	10	9	10	14	15	15
	Av. 10 years, 1886-1895	41	66	68	66	58	41	26	17	17	24	30	41	55		11	13	11	12	13	12	10	7	6	8	11	12	12
	1895	44	67	74	84	80	50	27	19	17	14	26	41	50		12	18	10	14	16	13	11	5	6	8	13	16	13
	1896	44	60	78	79	53	30	22	18	16	27	39	49	58		8	16	10	11	9	5	5	6	5	6	3	6	12
	In 1896 Greater than Av. 1877-1895	3	—	13	16	—	—	—	—	—	—	1	7	8		6	2	8	7	9	11	9	4	4	4	11	9	3
	In 1896 Less than Av. 1877-95	—	2	—	—	—	10	5	1	3	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Greater than Av. 1886-1895†	3	—	10	13	—	—	—	1	—	3	9	8	3		3	3	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Less than Av. 1886-95†	6	—	—	—	3	11	4	—	1	—	—	—	—		3	—	1	1	4	7	5	1	1	2	8	6	—
Neuralgia.	Av. 17 years, 1879-1895	64	67	69	71	70	65	62	58	56	57	61	65	66	Tonsillitis.	47	58	59	59	54	47	39	33	32	35	44	53	58
	Av. 10 years, 1886-1895	62	66	68	70	69	64	60	57	55	56	60	62	63		46	57	57	58	54	47	38	33	31	34	43	52	56
	1895	56	58	63	69	65	63	57	51	49	45	53	52	56		43	54	54	55	55	45	38	32	31	26	36	45	53
	1896	54	65	62	64	57	50	50	44	43	45	56	59	57		45	57	52	49	46	37	32	33	30	40	47	56	58
	In 1896 Greater than Av. 1879-1895	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Less than Av. 1879-95	10	2	7	7	13	15	12	14	13	12	5	6	9		2	1	7	10	8	10	7	—	—	—	—	—	—
	In 1896 Greater than Av. 1886-1895†	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
	In 1896 Less than Av. 1886-95†	8	1	6	6	12	14	10	13	12	11	4	3	6		1	—	—	9	8	10	6	—	—	—	6	4	2

* For neuralgia and tonsillitis an average for the 17 years, 1879-1895.

† Other statements for 1896, and months in 1896, relative to these diseases are given in Table 2, and in Exhibits XII., XIV., XV. and XVI., where are also given for convenient comparison statements of coincident meteorological conditions.

‡ This comparison is made because of change of plan of reports in May, 1885, as explained on page 84.

The lines for 1896 in Exhibit XIII. are graphically represented in Diagrams 1, 2, 3 and 4 of this article.

DIAGRAM 3—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1896.

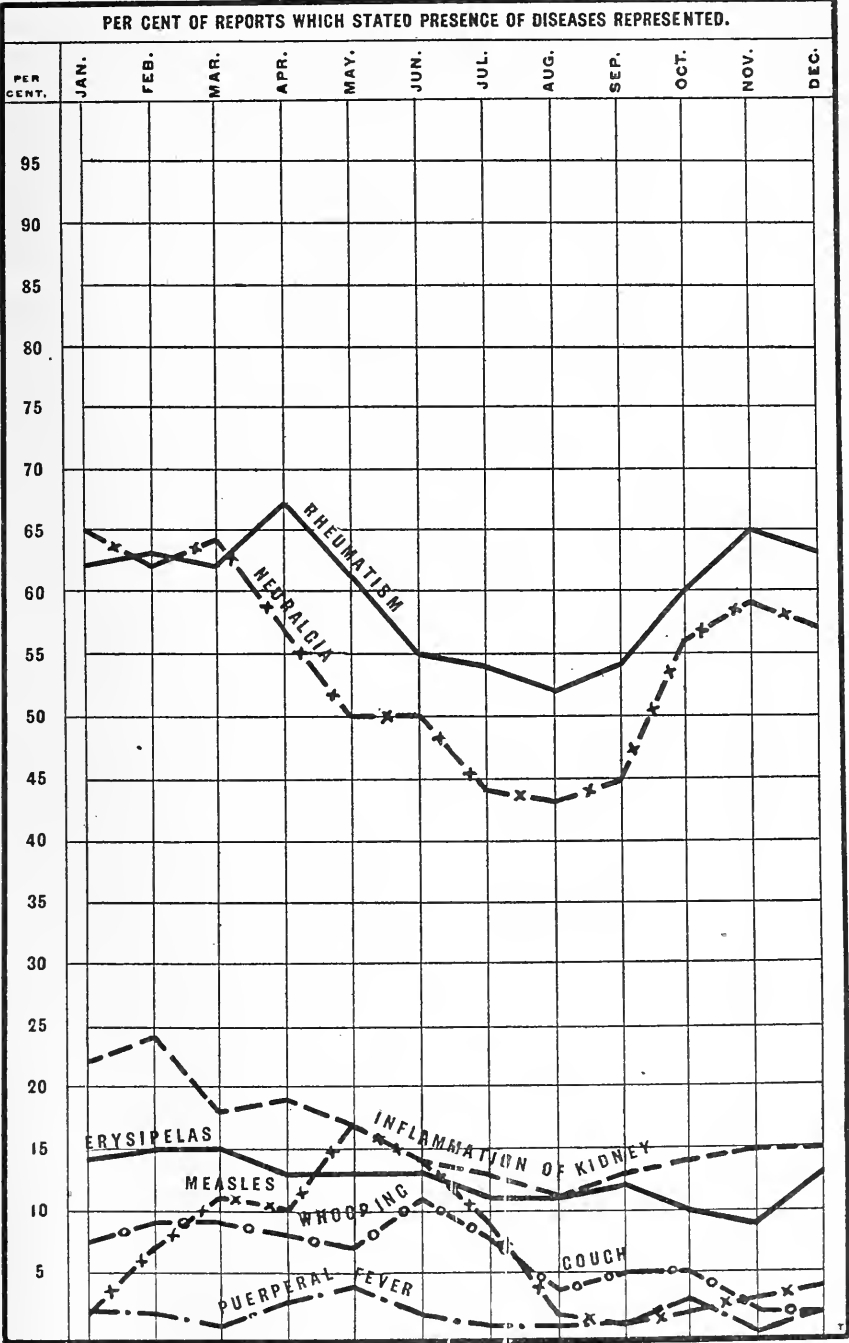


EXHIBIT XIV.—DIPHTHERIA AND TONSILLITIS.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Diphtheria and Tonsillitis and what were the Meteorological Conditions as Observed at Stations in Michigan.**

DIPHTHERIA.				Tempera- ture, F.		Humidity of Air, Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative, Scale of 10°.		Per Hour by Anemometer.		Atmospheric Pres- sure, Inches, Reduced to 32° F.			
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of, Av. Order of Prevalence where Present, †, ‡.	Av. Daily Range by Reg- istering Thermometers.		Average of Three Daily Observations.	Relative Per Cent of Saturation.		Inhaled, ‖	Exhaled in ex- cess of that Inhaled, ‖	Average Per Cent of Cloudiness.	Ozone, Relative, Scale of 10°.		Av. Velocity of Wind, Miles Per Hour by Anemometer.	Range.				
		Nov.,	Dec.,		Sept.,	Av.				Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions **	Average Pressure.		
More than Av. Per Cent of Diphtheria.	{ Nov.	12	3.2	14.64	38.70	81	2.60	1.63	10.05	77	α 3.45	α 3.95	12.3	1.012	.254	b	29.175
	{ Oct.	10	2.8	118.28	45.80	α 76	3.06	1.91	9.77	α 50	α 3.29	α 3.43	α 9.0	α .815	α .131	b	29.153
	{ Dec.	9	3.1	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	α 9.1	.981	.235	b	29.214
	{ Sept.	6	2.7	118.22	658.57	80	4.66	2.91	8.77	61	α 3.15	α 3.54	α 9.2	.956	.232		29.129
	Av.	5	3.7	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206		29.137
Less than Av. Per Cent of Diphtheria.	{ Jan.	5	4.9	111.49	124.88	α 83	b 1.54	.96	10.72	α 79	α 3.91	4.04	9.8	α 1.051	α .226		29.208
	{ Feb.	5	4.4	115.56	124.57	α 79	b 1.50	.94	10.74	α 65	α 4.12	α 4.61	α 11.8	α 1.169	α .307	b	28.979
	{ May	3	3.8	21.82	64.77	72	5.03	3.14	8.54	41	α 3.83	α 4.53	α 10.3	.804	.186	b	29.078
	{ June	3	4.2	21.27	68.12	72	5.64	3.53	8.15	39	3.67	α 4.40	7.4	.617	.135	b	29.105
	{ Aug.	3	4.8	19.93	69.61	α 78	6.40	4.00	7.68	41	α 4.00	α 4.37	8.0	.734	.156	b	29.152
	{ July	2	4.0	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b	29.134
	{ Mar.	2	6.5	116.48	123.11	76	b 1.56	.98	10.70	52	α 4.20	α 4.64	α 12.0	α 1.075	α .286		29.149
	{ Apr.	1	6.5	19.39	51.33	74	3.69	2.31	9.37	52	α 4.07	α 4.48	α 11.2	α .901	.176		29.161
	Av.																
TONSILLITIS.																	
More than Av. Per Cent of Tonsillitis.	{ Dec.	58	2.2	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	α 9.1	.981	.235	b	29.214
	{ Jan.	57	2.7	11.49	24.88	83	1.54	.96	10.72	79	3.91	α 4.04	9.8	1.051	.226	b	29.208
	{ Nov.	56	2.3	14.64	38.70	81	2.60	1.63	10.05	77	α 3.45	α 3.95	12.3	1.012	.254	b	29.175
	{ Feb.	52	3.1	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307		28.979
	{ Mar.	49	3.1	16.48	28.11	α 76	1.56	.98	10.70	α 52	4.20	4.64	12.0	1.075	.286	b	29.149
	{ Oct.	47	2.3	118.28	45.80	α 76	3.06	1.91	9.77	α 50	α 3.29	α 3.43	α 9.0	α .815	α .131	b	29.153
	{ Apr.	46	2.6	119.39	151.33	α 74	b 3.69	2.31	9.37	α 52	4.07	4.48	11.2	.901	α .176	b	29.161
	Av.	45	2.6	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206		29.137
Less than Av. Per Cent of Tonsillitis.	{ Sept.	40	2.6	18.22	58.57	α 80	4.66	2.91	8.77	α 61	3.15	3.54	9.2	α .956	α .232	b	29.129
	{ May	37	2.6	21.82	64.77	72	5.03	3.14	8.54	41	α 3.83	α 4.53	α 10.3	.804	.186	b	29.078
	{ July	33	2.8	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b	29.134
	{ June	32	2.6	21.27	68.12	72	5.64	3.53	8.15	39	3.67	α 4.40	7.4	.617	.135	b	29.105
	{ Aug.	30	3.0	19.93	69.61	α 78	6.40	4.00	7.68	41	α 4.00	α 4.37	8.0	.734	.156		29.152

* †, ‡, §, ||, ¶, **, For foot-notes with these marks, see Exhibit X.

α An exception to Proposition 1, relating to Diphtheria and Tonsillitis on page 123.

b An exception to Proposition 2, relating to Diphtheria and Tonsillitis on page 123.

EXHIBIT XV.—INFLUENZA AND SCARLET FEVER.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Influenza and Scarlet Fever and what were the Meteorological Conditions as observed at Stations in Michigan.**

INFLUENZA.				Temperature, F.		Humidity of Air, §		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative, Scale of 10 ⁹ .		Atmospheric Pressure, Inches. Reduced to 32° F.			
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present, †.	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.		Inhaled, ||	Exhaled in excess of that Inhaled, ¶	Average Per Cent of Cloudiness.	Ozone, Relative, Scale of 10 ⁹ .		Av. Velocity of Wind, Miles Per Hour by Anemometer.	Range.		
					Absolute — Grains of Vapor in a Cubic Foot of Air.	Relative Per Cent of Saturation.				Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Monthly and for Year.	Av. Daily, by 3 Daily Observations, **	
More than Av. Per Cent of Influenza.															
Mar.	79	1.5	16.48	28.11	a 76	1.56	.98	10.70	a 52	4.20	4.64	12.0	1.075	.286	b 29.149
Feb.	78	1.4	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
Jan.	60	1.5	11.49	24.88	83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
Dec.	58	1.6	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.981	.235	b 29.214
Apr.	55	1.7	b 19.39	b 51.33	a 74	b 3.69	2.31	9.37	a 52	4.07	4.48	11.2	.901	a .176	b 29.161
Nov.	49	1.9	14.64	38.70	81	2.60	1.63	10.05	77	a 3.45	a 3.95	12.3	1.012	.254	b 29.175
Av.	44	1.8	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Influenza.															
Oct.	39	2.0	18.28	b 45.80	76	b 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
May	30	2.1	21.82	64.77	72	5.03	3.14	8.54	41	a 3.83	a 4.53	a 10.3	.804	.156	b 29.078
Sept.	27	2.0	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129
June	22	2.2	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
July	18	2.1	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
Aug.	16	2.3	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152
SCARLET FEVER.															
More than Av. Per Cent of Scarlet Fever.															
Jan.	16	3.8	11.49	24.88	83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
Dec.	12	3.1	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.981	.235	b 29.214
Mar.	11	3.5	16.48	28.11	76	1.56	.98	10.70	a 52	4.20	4.64	12.0	1.075	.286	b 29.149
Feb.	10	3.3	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
Apr.	9	2.7	b 19.39	b 51.33	a 74	b 3.69	2.31	9.37	a 52	4.07	4.48	11.2	.901	a .176	b 29.161
Av.	8	3.1	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Scarlet Fever.															
Nov.	6	2.9	b 14.64	b 38.70	a 81	b 2.60	1.63	10.05	a 77	3.45	3.95	a 12.3	a 1.012	a .254	29.175
Sept.	6	2.9	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129
July	6	3.7	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
May	5	3.0	21.82	64.77	72	5.03	3.14	8.54	41	a 3.83	a 4.53	a 10.3	.804	.156	b 29.078
June	5	1.6	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
Aug.	5	3.4	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152
Oct.	3	1.7	18.28	b 45.80	76	b 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

α An exception to Proposition 1, relating to Influenza and Scarlet Fever, on page 123.

β An exception to Proposition 2, relating to Influenza and Scarlet Fever, on page 123.

EXHIBIT XVI.—RHEUMATISM AND NEURALGIA.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Rheumatism and Neuralgia and what were the Meteorological Conditions as Observed at Stations in Michigan.**

RHEUMATISM.				Temperature. F.		Humidity of Air, % Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		Atmospheric Pressure, Inches. Reduced to 32° F.				
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present,†	Av. Daily Range by Registering Thermometers.											Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cubic Foot of Air.	Inhaled ‡	Exhaled in excess of that Inhaled. ‡	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles Per Hour by Anemometer.	Range.
				Monthly and for Year.	Av. Daily, by 3 Daily Observations.**	Average Pressure.										
More than Av. Per Cent of Rheumatism.	Apr.	67	2.2	b 19.39	b 51.33	a 74	b 3.69	2.31	9.37	a 52	4.07	4.48	11.2	.901	a .176	b 29.161
	Nov.	65	2.2	14.64	38.70	a 81	2.60	1.63	10.05	77	a 3.45	a 3.95	12.3	1.012	.254	b 29.175
	Dec.	63	2.4	13.12	29.24	a 82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.981	.235	b 29.214
	Feb.	63	2.8	15.56	24.57	a 79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Mar.	62	2.9	16.48	28.11	a 76	1.56	.98	10.70	a 52	4.20	4.64	12.0	1.075	.286	b 29.149
	Jan.	62	2.5	11.49	24.88	a 83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
	May	61	1.9	b 21.82	b 64.77	a 72	b 5.03	3.14	8.54	a 41	3.83	4.53	10.3	a .804	a .186	29.078
Av.	60	2.3	17.48	47.59	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Rheumatism.	Oct.	60	2.2	18.28	b 45.80	76	b 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	June ..	55	2.0	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
	Sept. ..	54	2.3	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129
	July ..	54	2.1	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
	Aug.	52	2.5	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152
NEURALGIA.																
More than Av. Per Cent of Neuralgia.	Jan.	65	2.4	11.49	24.88	a 83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
	Mar.	64	2.7	16.48	28.11	a 76	1.56	.98	10.70	a 52	4.20	4.64	12.0	1.075	.286	b 29.149
	Feb.	62	2.5	15.56	24.57	a 79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Nov.	59	2.3	14.64	38.70	a 81	2.60	1.63	10.05	77	a 3.45	a 3.95	12.3	1.012	.254	b 29.175
	Apr.	57	2.2	b 19.39	b 51.33	a 74	b 3.69	2.31	9.37	a 52	4.07	4.48	11.2	.901	a .176	b 29.161
	Dec.	57	2.4	13.12	29.24	a 82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.981	.235	b 29.214
Oct.	56	2.1	b 18.28	b 45.80	a 76	3.06	1.91	9.77	a 50	a 3.29	a 3.43	a 9.0	a .815	a .131	b 29.153	
Av.	54	2.3	17.48	47.59	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Neuralgia.	May	50	2.1	21.82	64.77	72	5.03	3.14	8.54	41	a 3.83	a 4.53	a 10.3	.804	.186	b 29.078
	June ..	50	1.9	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
	Sept.	45	2.3	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129
	July	44	2.2	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
	Aug.	43	2.7	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152

*, †, ‡, §, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Rheumatism and Neuralgia on page 123.*

b An exception to Proposition 2, relating to Rheumatism and Neuralgia on page 123.

EXHIBIT XVII.—PULMONARY CONSUMPTION AND PLEURITIS.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Pulmonary Consumption and Pleuritis and what were the Meteorological Conditions as Observed at Stations in Michigan.**

CONSUMPTION.			Tempera- ture. F.		Humidity of Air, Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative, Scale of 10 ² .		Av. Velocity of Wind, Miles per Hour by Anemometer.	Atmospheric Pres- sure, Inches, Reduced to 32° F.				
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present, †.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled. ‖	Exhaled in ex- cess of that Inhaled. ‖	Average Per Cent of Cloudiness	Day Observation, 7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.	Range.		Average Pressure.	
													Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions. **		
More than Av. Per Cent of Consump- tion.	{ May ..	26	2.4	b2.8	b64.77	a 72	b 5.03	3.14	8.54	a 41	3.83	4.53	10.3	a .804	a .186	29.078
	{ Aug. ...	25	3.0	19.9	b59.6	78	6.40	4.00	7.68	a 41	4.00	4.37	a 8.0	a .734	a .156	b 29.152
	{ Sept. .	25	2.7	18.2	58.57	80	b 4.66	2.91	8.77	61	a 3.15	a 3.54	a 9.2	.956	.232	29.129
	{ June. .	24	2.2	21.27	b68.12	72	b 5.64	3.53	8.15	a 39	a 3.67	4.40	a 7.4	a .617	a .135	29.105
	{ Feb. .	24	4.1	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Av.	23	3.0	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Average Per Cent of Consumption.	{ Jan.	22	3.6	11.4	b24.88	a 83	b 1.54	.96	10.72	a 79	a 3.91	4.04	9.8	a 1.051	a .226	29.208
	{ Mar.	22	4.1	b16.45	b28.11	76	b 1.56	.98	10.70	52	a 4.20	a 4.64	a 12.0	a 1.075	a .286	29.149
	{ July.	22	2.5	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
	{ Oct.	22	2.9	18.28	b45.80	76	b 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	{ Nov.	22	2.8	b14.64	b38.70	a 81	b 2.60	1.63	10.05	a 77	3.45	3.95	a 12.3	a 1.012	a .254	29.175
	{ Apr.	21	2.7	19.39	51.33	74	3.69	2.31	9.37	52	a 4.07	a 4.48	a 11.2	a .901	.176	29.161
{ Dec.	21	2.9	b13.12	b29.24	a 82	b 1.75	1.09	10.59	a 71	a 3.78	a 4.29	9.1	a .951	a .235	29.214	
PLEURITIS.																
More than Av. Per Cent of Pleuritis.	{ Mar.	27	4.0	16.48	28.11	a 76	1.56	.98	10.70	a 52	4.20	4.64	12.0	1.075	.286	b 29.149
	{ Feb.	21	4.2	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	{ Jan.	20	3.8	11.49	24.88	83	1.54	.96	10.72	79	3.91	a 4.04	9.8	1.051	.226	b 29.208
	{ Apr.	19	3.3	b19.39	b51.33	a 74	b 3.69	2.31	9.37	a 52	4.07	4.48	11.2	.901	a .176	b 29.161
	{ Nov.	18	3.1	14.64	38.70	81	2.60	1.63	10.05	77	a 3.45	a 3.95	12.3	1.012	.254	b 29.175
	{ Dec.	17	3.3	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	a 9.1	.951	.235	b 29.214
Av.	16	3.4	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Pleuritis.	{ May	16	2.8	21.82	64.77	72	5.03	3.14	8.54	41	a 3.83	a 4.53	a 10.3	.804	.186	b 29.078
	{ June	15	3.1	21.27	68.12	72	5.64	3.53	8.15	39	3.67	a 4.40	7.4	.617	.135	b 29.105
	{ Sept.	14	3.2	18.22	58.57	a 80	4.66	2.91	8.77	a 61	3.15	3.54	9.2	a .956	a .232	b 29.129
	{ Oct.	11	2.9	18.28	b45.80	76	b 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	{ July	11	2.9	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	b 29.134
	{ Aug.	6	3.5	19.93	69.61	a 78	6.40	4.00	7.68	41	a 4.00	a 4.37	8.0	.734	.156	29.152

* †, ‡, §, ||, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Pulmonary Consumption and Pleuritis, on page 123.

b An exception to Proposition 2, relating to Pulmonary Consumption and Pleuritis, on page 123.

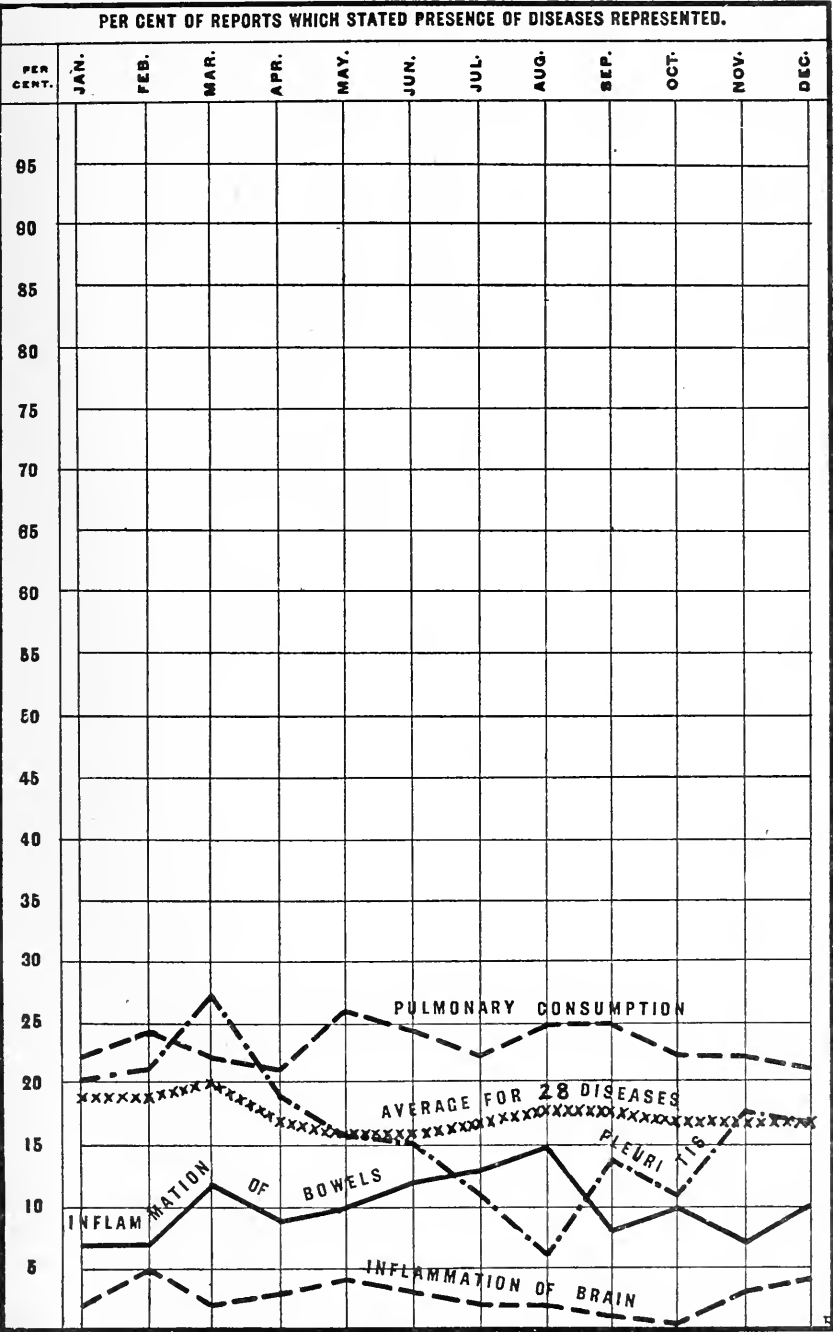
EXHIBIT XVIII.—SICKNESS FROM CONSUMPTION.—1877-96.—*By Year and Months for each of the twenty years, 1877-96, and an Average for the eighteen years, 1878-95,* also for the ten years, 1886-95; Stating on what Per Cent of the Weekly Reports received CONSUMPTION was reported Present, and Comparing the Per Cents for 1896 with the Averages for corresponding Months in those Years.*

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 18 years, 1878-95*.....	54	55	56	58	59	56	54	52	51	52	52	52	52
Average 10 years, 1886-95.....	45	47	46	48	50	47	44	43	42	42	42	42	43
1877*.....	52	50	47	47	53	49	50	43	35	38	54	68	65
1878.....	71	67	72	76	75	72	68	68	65	70	73	73	71
1879.....	70	71	71	69	77	74	73	69	67	67	69	67	64
1880.....	68	65	69	70	72	70	69	66	62	66	66	68	70
1881.....	71	74	76	73	76	69	68	67	67	70	73	74	67
1882.....	66	66	68	66	66	69	66	67	63	63	65	62	65
1883.....	61	69	66	66	65	62	61	59	55	57	58	58	60
1884.....	63	56	61	66	70	67	65	63	63	63	65	61	58
1885.....	58	60	68	71	69	58	61	56	52	54	55	56	56
1886.....	55	61	58	60	61	60	55	51	52	48	51	55	54
1887.....	51	53	54	61	61	54	48	48	47	45	48	47	50
1888.....	49	50	51	52	47	53	56	51	49	44	43	44	48
1889.....	48	49	49	50	50	46	47	47	46	50	52	49	51
1890.....	52	50	53	55	61	57	52	45	50	51	51	49	55
1891.....	49	58	51	54	59	55	46	45	43	43	44	46	45
1892.....	38	45	45	40	41	33	35	39	37	39	36	34	37
1893.....	38	35	38	43	45	43	37	35	37	37	32	37	38
1894.....	36	36	33	33	41	40	37	39	35	37	34	33	29
1895.....	29	33	31	33	34	29	30	29	28	25	25	24	24
1896 (see Diagram on opposite page).....	23	22	24	22	21	26	24	22	25	25	22	22	21
In 1896 Less than Av. 1878-95.....	31	33	32	36	38	30	30	30	26	27	30	30	31
In 1896 Less than Av. 1886-95†.....	22	25	22	26	29	21	20	21	17	17	20	20	22

* As consumption was not printed on the first blanks, nor on all used in 1877, that year is excluded from the average line.

† This comparison is made because of change of plan of reports in May, 1885, as explained on page 84.

DIAGRAM 4—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1896 .



Relations of Diarrhea to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **less** than the average for the year. In Exhibit XIX., the letter *a* marks exceptions to this proposition for the year 1896.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **greater** than the average for the year. In Exhibit XIX., the letter *b* marks exceptions to this proposition for 1896.

Explanations of Propositions 1 and 2 are given on page 122, and a summary of the evidence in Exhibit XIX., is given in Exhibit XXVI., on a following page.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 1, it is true also that the quantity of vapor inhaled daily was **greater** than the average, and the quantity exhaled daily in excess of that inhaled was **less** than the average in months when **more** than the average per cent of reports stated presence of diarrhea; and that **less** vapor was inhaled and a **greater** excess exhaled daily in months when the per cent of reports stating presence of diarrhea, was **less** than the average.

Proposition 3 is true also in relation to cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, whooping-cough, cholera morbus and dysentery, treated in Exhibits XIX., XXI., XXII., XXIII. and XXIV.

On what per cent of the weekly reports received, by months in the nineteen years, 1877-1895, the ten foregoing diseases were reported present, is stated in Exhibit XX. In Diagram 1, is graphically represented by months what per cent of the reports in each month in 1896, stated the presence of diarrhea.

The greatest sickness reported from diarrhea in 1896, was in the months of June, July, August, September and October.

As shown by Exhibit XX., the reports indicate a decreased prevalence of diarrhea in the year 1896. Compared with the year 1895, there was a slightly increased prevalence of diarrhea in January and November; a slightly decreased prevalence in February, March, May, June, July, August and September, and a marked decrease in April, October and December.

Compared with the average for corresponding months in the nineteen years, 1877-1895, the per cent of reports of diarrhea in 1896 show a decreased prevalence in each month of the year.

The average temperature was slightly higher in 1896, than the average for the nineteen years, 1877-1895. In 1896, it was also higher in the months of January, February, April, May, June, July, August, November and December; and lower in the months of March, September and October. The absolute humidity was slightly more in 1896, than the average

for the nineteen years, 1877-1895. In 1896, it was more in the months of January, April, May, June, July, August and November; and less in the months of February, March, September, October and December, than the average in the corresponding months in the nineteen years, 1877-1895. The relative humidity was slightly more in 1896, than the average for the eighteen years, 1878-1895. In 1896, it was more in the months of April, May, July, August, September and November; and less in the months of February, March, June and December, than the average in the corresponding months in the eighteen years, 1878-1895. In January and October it was the same.

Relations of Cholera Infantum and other "Warm Weather" Diseases to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles, or whooping-cough), the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibit XIX., the letter *a* marks exceptions to this proposition for the year 1896.

Explanations of Propositions 1 and 2 are given on page 122, and a summary of the evidence of Exhibit XIX., is given in Exhibit XXVI., on a following page.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, or whooping-cough), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were **less** than the average for the year; and that in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibit XIX., the letter *b* marks exceptions to this proposition for 1896.

What per cent of all the weekly reports of sickness in each month in 1896, stated the presence of cholera infantum is graphically represented by months in Diagram 1. What per cent of the reports received by months in the nineteen years, 1877-1895, stated presence of cholera infantum and of the other diseases mentioned in Propositions 1 and 2, is stated in Exhibit XX., on a subsequent page.

Cholera infantum was most prevalent during the hot months in 1896. Compared with the average for the nineteen years, 1877-1895, it was more prevalent in 1896 in the month of May, and less prevalent in the months of January, March, April, July, August, September, October, November and December. In February and June it was the same.

Special mention is here made relative to the remarkable decrease in the prevalence of intermittent fever in the year and in each month of the year 1896, when compared with the averages for the nineteen years, 1877-1895, and for the ten years, 1886-1895, as shown in Exhibit XX.

EXHIBIT XIX.—DIARRHEA AND CHOLERA INFANTUM.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Diarrhea and Cholera Infantum and what were the Meteorological Conditions as observed at Stations in Michigan.**

DIARRHEA.				Tempera- ture, F.		Humidity of Air; Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.			Atmospheric Pres- sure, Inches. Rednced to 32° F.			
Months in Order of (Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present, †, ‡.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air			Average Per Cent of Cloudiness.	7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.
							Inhaled. ||	Exhaled in ex- cess of that Inhaled. ¶		Day Observation,	9			Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions.**	
More than Av. Per Cent of Diarrhea.	Aug.	65	1.6	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	29.152
	Sept.	58	1.8	18 22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	July	56	1.8	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	a 29.134
	June	37	2.1	21.27	68.12	72	5.64	3.53	8.15	39	3.67	b 4.40	7.4	.617	.135	a 29.105
	Oct.	36	2.4	18 28	a 45.80	76	a 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
Av.		34	2.5	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Diarrhea.	Jan.	24	3.3	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
	Nov.	23	2.5	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
	May	23	2.7	a 21.82	a 64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
	Feb.	23	3.8	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Mar.	22	4.0	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149
	Apr.	19	2.8	a 19.39	a 51.33	b 74	a 3.69	2.31	9.37	b 52	4.07	4.48	11.2	.901	b .176	a 29.161
	Dec.	15	3.4	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
CHOLERA INFANTUM.																
More than Av. Per Cent of Cholera In- fantum.	Aug.	29	2.7	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	29.152
	July	20	2.8	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	a 29.134
	Sept.	18	3.0	18 22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	June	9	3.2	21.27	68.12	72	5.64	3.53	8.15	39	3.67	b 4.40	7.4	.617	.135	a 29.105
Av.		8	2.9	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Cholera Infantum.	May	4	2.7	a 21.82	a 64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
	Oct.	4	2.7	a 18.28	45.80	b 76	3.03	1.91	9.77	b 50	b 3.29	b 3.43	b 9.0	b .815	b .131	a 29.153
	Nov.	1	2.0	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
	Dec.	1	2.5	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
	Jan.	1	4.5	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
	Feb.	1	4.3	15 56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Apr.	1	2.5	a 19.39	a 51.33	b 74	a 3.69	2.31	9.37	b 52	4.07	4.48	11.2	.901	b .176	a 29.161
Mar.		0.7	3.5	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Diarrhea and Cholera Infantum, on page 137.

b An exception to Proposition 2, relating to Diarrhea and Cholera Infantum, on page 137.

EXHIBIT XX.—By Year and Months for 1896 and for the preceding year, and an Average for the nineteen years, 1877-95; also for the ten years, 1886-95. Stating on what Per Cent of the Weekly Reports received DIPHTHERIA, CHOLERA INFANTUM, INTERMITTENT FEVER, REMITTENT FEVER, TYPHOID FEVER, TYPHO-MALARIAL FEVER, MEASLES, WHOOPING-COUGH, CHOLERA MORBUS and DYSENTERY were Reported Present, and Comparing the Per Cents for 1896, with the Averages for Corresponding Months in those years.*

Years, etc.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Cholera Infantum.													
Diarrhea.	Av. 19 years, 1877-1895....	45	27	27	29	31	34	42	68	82	77	54	33	27	13	2	1	3	2	3	2	28	44	34	12	3	2	
	Av. 10 years, 1886-1895....	44	27	27	29	30	32	40	64	79	75	51	31	26	12	2	1	1	2	3	2	25	40	33	12	3	2	
	1895.....	42	23	25	29	33	30	44	64	73	71	50	21	24	12	2	1	1	2	5	9	25	44	34	12	3	2	
	1896.....	34	24	23	22	19	23	37	56	65	58	36	23	15	8	1	1	0.7	1	4	8	20	29	37	40	13	1	0
	In 1896 Greater than Av. 1877-1895.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1877-95.....	11	3	4	7	12	11	5	12	17	19	18	10	12	4	1	—	1.3	1	—	—	8	15	16	8	2	1	
	In 1896 Greater than Av. 1886-1895†.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1886-95†.....	10	3	4	7	11	9	3	8	14	17	15	8	11	4	1	—	0.3	1	—	—	5	11	15	8	2	1	
															Cholera Infantum.													
Intermittent Fever.	Av. 19 years, 1877-1895....	54	44	45	48	45	58	59	61	62	61	59	52	46	37	31	30	31	34	35	37	39	45	47	46	38	33	
	Av. 10 years, 1886-1895....	36	30	30	32	37	37	38	41	43	41	39	34	30	26	23	22	24	24	24	25	27	31	34	33	28	24	
	1895.....	22	17	13	16	19	22	27	30	27	26	23	20	19	20	17	15	15	13	18	23	25	20	24	28	21	22	
	1896.....	19	14	13	13	21	23	23	24	23	23	22	17	15	16	21	15	15	10	14	15	17	22	20	17	15	14	
	In 1896 Greater than Av. 1877-1895.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1877-95.....	35	30	32	35	33	35	36	37	39	38	37	35	31	21	10	15	16	24	21	22	22	23	27	29	23	19	
	In 1896 Greater than Av. 1886-1895†.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1886-95†.....	17	16	17	19	16	14	15	17	20	18	17	17	15	10	2	7	7	14	10	10	10	9	14	16	13	10	
															Remittent Fever.													
Typhoid Fever.	Av. 19 years, 1877-1895....	11	9	7	5	5	5	7	14	20	22	19	13	13	16	12	10	9	9	8	5	11	19	29	31	22	15	
	Av. 10 years, 1886-1895....	10	7	5	4	4	4	4	7	14	19	21	17	11	13	10	8	5	5	5	8	5	7	13	17	12	8	
	1895.....	13	8	5	5	8	3	3	13	19	23	31	24	14	4	4	2	3	2	3	1.0	3	5	5	10	4	1	
	1896.....	10	10	10	3	3	3	6	9	16	24	17	11	4	2	0.8	0.3	0.7	0.4	—	1.0	6	2	4	5	6	2	1
	In 1896 Greater than Av. 1877-1895.....	—	1	3	—	—	—	1	2	2	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1877-95.....	1	—	—	2	2	2	—	—	—	—	5	8	9	14	11	2	9	7	8	3	6	7	4	9	15	20	14
	In 1896 Greater than Av. 1886-1895†.....	—	3	5	—	—	—	2	2	2	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1886-95†.....	—	—	—	1	1	—	—	—	—	—	4	6	7	7	5.2	4.7	4.3	5.6	4	4	4	5	9	12	10	7	
															Typho-malarial Fever.													
Measles.	Av. 19 years, 1877-1895....	11	9	12	15	19	22	18	11	5	4	4	5	6	16	15	15	15	15	16	18	18	17	14	15	15		
	Av. 10 years, 1886-1895....	9	7	11	13	16	18	15	8	4	2	4	3	5	12	10	11	11	12	13	14	14	14	12	10	10		
	1895.....	4	3	4	5	6	7	8	4	2	2	0.2	2	2	9	15	11	9	9	8	9	12	9	9	4	5	5	
	1896.....	7	2	7	11	10	17	14	9	2	1	2	3	4	7	8	9	9	8	7	11	8	4	5	5	2	2	
	In 1896 Greater than Av. 1877-1895.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1877-95.....	4	7	5	4	9	5	4	2	3	3	2	2	2	9	7	6	6	7	9	5	10	14	12	9	13	13	
	In 1896 Greater than Av. 1886-1895†.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1886-95†.....	2	5	4	2	6	1	1	—	1	2	1	1	—	5	2	2	2	4	6	1	6	10	7	5	8	8	
															Whooping-cough.													
Cholera Morbus.	Av. 19 years, 1877-1895....	17	4	4	5	5	7	16	41	52	38	14	6	4	18	7	6	7	7	8	12	27	49	45	23	10	6	
	Av. 10 years, 1886-1895....	15	3	3	3	4	7	15	35	48	37	13	5	4	16	6	6	6	6	7	10	22	43	41	22	9	6	
	1895.....	15	5	6	3	4	7	17	30	37	38	14	4	4	15	5	7	4	5	5	9	27	42	38	25	6	2	
	1896.....	11	3	2	2	3	7	16	27	36	21	6	4	2	11	4	4	3	6	5	11	21	33	24	13	3	3	
	In 1896 Greater than Av. 1877-1895.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1877-95.....	6	1	2	3	2	—	14	16	17	8	2	2	—	7	3	2	4	1	3	1	6	16	21	10	7	3	
	In 1896 Greater than Av. 1886-1895†.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	In 1896 Less than Av. 1886-95†.....	4	—	1	1	1	—	8	12	16	7	1	2	—	5	2	2	3	—	2	—	1	10	17	9	6	3	
															Dysentery.													

* Other statements for 1896, and months in 1896, relative to these diseases are given in Table 2, and in Exhibits XIX., XXI., XXII., XXIII., and XXIV., where are also given for convenient comparison statements of coincident meteorological conditions. The lines for 1896 are graphically represented in Diagrams 1, 3 and 5 in this article.

† This comparison is made because of change of plan of reports in May, 1885, as explained on page 84.

DIAGRAM 5—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1896.

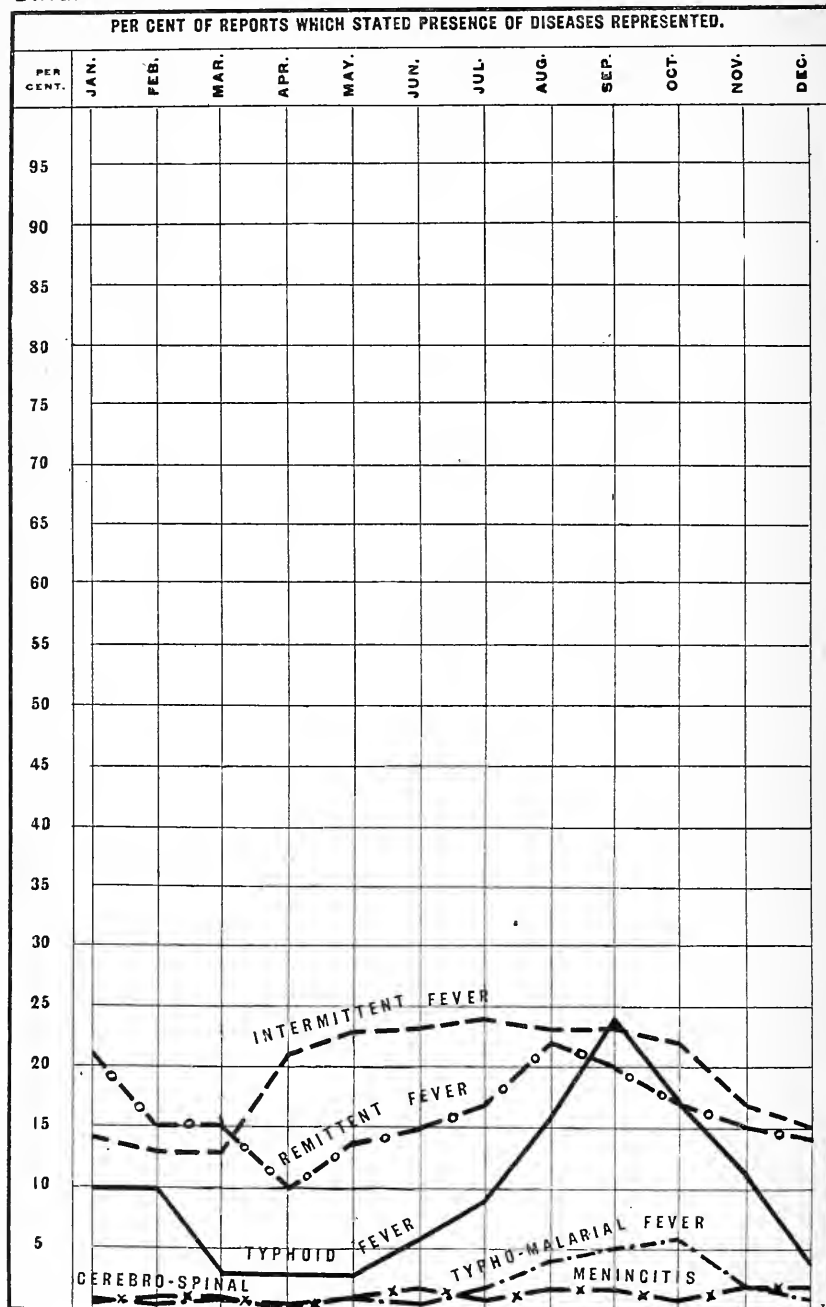


EXHIBIT XXI.—INTERMITTENT FEVER AND REMITTENT FEVER.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Intermittent Fever and Remittent Fever and what were the Meteorological Conditions as Observed at Stations in Michigan.**

INTERMITTENT FEVER.			Temperature, F.		Humidity of Air, % Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.			Ozone, Relative. Scale of 10 ² .		Per Hour by Anemometer.	Atmospheric Pressure, Inches. Reduced to 32° F.			
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where Present.†, ‡	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cubic Foot of Air.	Inhaled ||	Exhaled in excess of that Inhaled. §	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Monthly and for Year.	Range.		
														Av. Daily, by 3 Daily Observations.**	Average Pressure.	
More than Av. Per Cent of Intermittent Fever.	July ...	24	2.2	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	a 29.134
	Aug.	23	2.3	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	29.152
	Sept. ...	23	2.4	18.22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	May	23	2.5	21.82	64.77	72	5.03	3.14	8.54	41	b 3.83	b 4.53	b 10.3	.804	.186	a 29.078
	June	23	2.5	21.27	68.12	72	5.64	3.53	8.15	39	3.67	b 4.40	7.4	.617	.135	a 29.105
	Oct.	22	2.5	18.28	a 45.80	76	a 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	Apr.	21	3.0	19.39	51.33	74	3.69	2.31	9.37	52	b 4.07	b 4.48	b 11.2	b .901	.176	29.161
Av.	19	2.7	17.48	47.69	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Intermittent Fever.	Nov. ...	17	2.8	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
	Dec. ...	15	2.8	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
	Jan. ...	14	3.3	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
	Feb. ...	13	3.9	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Mar. ...	13	3.5	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149
REMITTENT FEVER.																
More than Av. Per Cent of Remittent Fever.	Aug. ...	22	2.5	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	a 29.152
	Jan. ...	21	3.2	a 11.49	a 24.88	b 83	a 1.54	.96	10.72	b 79	b 3.91	4.04	9.8	b 1.051	b .226	a 29.208
	Sept. ...	20	2.4	18.22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	Oct. ...	17	2.9	18.28	a 45.80	76	a 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	July ...	17	3.0	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	a 29.134
Av.	16	2.9	17.48	47.69	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Remittent Fever.	Feb.	15	3.5	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Mar.	15	3.6	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149
	June	15	2.6	a 21.27	a 68.12	b 72	a 5.64	3.53	8.15	b 39	b 3.67	4.40	b 7.4	b .617	b .135	29.105
	Nov.	15	2.8	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
	Dec.	14	3.1	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
	May	14	2.6	a 21.82	a 64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
	Apr.	10	2.5	a 19.39	a 51.33	b 74	a 3.69	2.31	9.37	b 52	4.07	4.48	11.2	.901	b .176	a 29.161

*. †, ‡, §, ||, ¶. For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Intermittent Fever and Remittent Fever, on page 137.

b An exception to Proposition 2, relating to Intermittent Fever and Remittent Fever, on page 137.

EXHIBIT XXII.—TYPHOID FEVER AND TYPHO-MALARIAL FEVER.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Typhoid Fever and Typho-Malarial Fever and what were the Meteorological Conditions as Observed at Stations in Michigan.**

TYPHOID FEVER.				Tempera- ture. F.		Humidity of Air, g. Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		Per Miles Per Hour by Anemometer.	Atmospheric Pres- sure, Inches. Reduced to 32° F.			
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present, †.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled. ||	Exhaled in ex- cess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.		Av. Velocity of Wind, Miles Per Hour by Anemometer.	Range.		Average Pressure.
														Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions **	
More than Av. Per Cent of Typhoid Fever.	{ Sept. . .	24	2.3	18.22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	{ Oct. . .	17	2.3	18.28	a 45.80	76	a 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	{ Aug. . .	16	2.9	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	29.152
	{ Nov. . .	11	3.4	a 14.64	a 38.70	b 81	a 2.60	1.63	10.05	b 77	3.45	3.95	b 12.3	b 1.012	b .254	29.175
	Av.	10	3.3	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Typhoid Fever.	{ Jan. . . .	10	4.6	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
	{ Feb. . . .	10	4.5	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	{ July . . .	9	3.4	a 19.50	a 71.02	b 76	a 6.43	4.02	7.66	b 48	b 3.03	b 3.62	b 7.6	b .499	b .148	29.134
	{ June . . .	6	4.3	a 21.27	a 68.12	b 72	a 5.64	3.53	8.15	b 39	b 3.67	4.40	b 7.4	b .617	b .135	29.105
	{ Dec. . . .	4	3.4	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
	{ Mar. . . .	3	6.3	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149
	{ Apr. . . .	3	2.5	a 19.39	a 51.33	b 74	a 3.69	2.31	9.37	b 52	4.07	4.48	11.2	.901	b .176	a 29.161
	{ May . . .	3	4.0	a 21.82	a 64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
TYPHO-MAL. FEVER																
More than Av. Per Cent of Typho- Mal. Fev.	{ Oct. . .	6	2.3	18.28	a 45.80	76	a 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
	{ Sept. . .	5	1.8	18.22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	{ Aug. . .	4	3.0	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	29.152
Av.	2	2.8	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Typho-Malarial Fever.	{ Nov. . . .	2	2.8	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
	{ July . . .	2	2.5	a 19.50	a 71.02	b 76	a 6.43	4.02	7.66	b 48	b 3.03	b 3.62	b 7.6	b .499	b .148	29.134
	{ Dec. . . .	1	5.0	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
	{ May . . .	1	3.0	a 21.82	a 64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
	{ Jan. . . .	0.8	5.0	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
	{ Mar. . . .	0.7	5.5	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149
	{ June . . .	0.6	1.5	a 21.27	a 68.12	b 72	a 5.64	3.53	8.15	b 39	b 3.67	4.40	b 7.4	b .617	b .135	29.105
	{ Apr. . . .	0.4	2.0	a 19.39	a 51.33	b 74	a 3.69	2.31	9.37	b 52	4.07	4.48	11.2	.901	b .176	a 29.161
	{ Feb. . . .	0.3	7.0	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

a. An exception to Proposition 1, relating to Typhoid Fever and Typho-Malarial Fever, on page 137.

b. An exception to Proposition 2, relating to Typhoid Fever and Typho-Malarial Fever, on page 137.

EXHIBIT XXIII.—MEASLES AND WHOOPING-COUGH.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Measles and Whooping-Cough and what were the Meteorological Conditions as Observed at Stations in Michigan.**

MEASLES.			Temperature. F.		Humidity of Air, % Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative, Scale of 10°.			Atmospheric Pres- sure, Inches. Reduced to 32° F.						
Months in Order of Great- est Per Cent. of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present, †.							Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.				Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled. ‖	Exhaled in ex- cess of that Inhaled. ¶	Average Per Cent of Cloudiness	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.
			Range.		Average Pressure.													
More than Av. Per Cent of Meas es.			{ May ----	17		1.9	21.82	64.77	72	5.03	3.14	8.54	41	b 3.83	b 4.53	b 10.3	.804	.186	a 29.078
			{ June.....	14	1.6	21.27	68.12	72	5.64	3.53	8.15	39	3.67	b 4.40	7.4	.617	.135	a 29.105
			{ Mar.....	11	4.4	a16.43	a23.11	76	a 1.56	.98	10.70	52	b 4.20	b 4.64	b 12.0	b1.075	b .286	29.149
			{ Apr.	10	3.8	19.39	51.33	74	3.69	2.31	9.37	52	b 4.07	b 4.48	b 11.2	b .901	.176	29.161
			{ July	9	2.7	19.50	71.02	76	6.43	4.02	7.66	45	3.03	3.62	7.6	.499	.148	a 29.134
Av.				7	2.7	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Average Per Cent of Meas es.			{ Feb.	7	3.4	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
			{ Dec.	4	2.0	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
			{ Nov.	3	2.5	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
			{ Oct.	2	1.0	a18.28	45.80	b 76	3.06	1.91	9.77	b 50	b 3.29	b 3.43	b 9.0	b .815	b .131	a 29.153
			{ Jan.	2	2.8	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
			{ Aug.	2	3.4	a19.93	a69.61	78	a 6.40	4.00	7.68	b 41	4.00	4.37	b 8.0	b .734	b .156	a 29.152
			{ Sept.	1	2.3	a18.22	a58.57	80	a 4.66	2.91	8.77	61	b 3.15	b 3.54	b 9.2	.956	.232	29.129
WHOOPING- COUGH.																		
More than Av. Per Cent of Whooping-Cough.			{ June.....	11	1.6	21.27	68.12	72	5.64	3.53	8.15	39	3.67	b 4.40	7.4	.617	.135	a 29.105
			{ Feb.	9	3.3	a15.56	a24.57	b 79	a 1.50	.94	10.74	b 65	b 4.12	b 4.61	b 11.8	b1.169	b .307	a 28.979
			{ Mar.	9	3.7	a16.48	a23.11	76	a 1.56	.98	10.70	52	b 4.20	b 4.64	b 12.0	b1.075	b .286	29.149
			{ July	8	1.3	19.50	71.02	76	6.43	4.02	7.66	45	3.03	3.62	7.6	.499	.148	a 29.134
			{ Apr.	8	2.2	19.39	51.33	74	3.69	2.31	9.37	52	b 4.07	b 4.48	b 11.2	b .901	.176	29.161
			{ Jan.	8	2.8	a11.49	a24.88	b 83	a 1.54	.96	10.72	b 79	b 3.91	4.04	9.8	b1.051	b .226	29.208
Av.				7	2.4	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Whoop- ing-Cough.			{ May ----	7	1.6	a21.82	a64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
			{ Sept.	5	2.9	a18.22	a58.57	80	a 4.66	2.91	8.77	61	b 3.15	b 3.54	b 9.2	.956	.232	29.129
			{ Oct.	5	2.7	a18.28	45.80	b 76	3.06	1.91	9.77	b 50	b 3.29	b 3.43	b 9.0	b .815	b .131	a 29.153
			{ Aug.	4	1.9	a19.93	a69.61	78	a 6.40	4.00	7.68	b 41	4.00	4.37	b 8.0	b .734	b .156	a 29.152
			{ Nov.	2	2.5	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
			{ Dec.	2	2.6	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214

* † ‡ § || ¶ **. For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Measles and Whooping-Cough, on page 137.

b An exception to Proposition 2, relating to Measles and Whooping-Cough, on page 137.

EXHIBIT XXIV.—CHOLERA MORBUS AND DYSENTERY.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Cholera Morbus and Dysentery and what were the Meteorological Conditions as observed at Stations in Michigan.**

CHOLERA MORBUS.				Tempera- ture, F.		Humidity of Air, § Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		Per Miles Per Hour by Anemometer.		Atmospheric Pres- sure, Inches. Reduced to 32° F.		
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present, †, ‡	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled. ||	Exhaled in ex- cess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Ozone, 7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.	Av Velocity of Wind, Miles Per Hour by Anemometer.	Range.		Average Pressure.
										Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions, **					
More than Av. Per Ct. of Chol- era Morbus.	Aug....	36	2.7	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	29.152
	July ..	27	2.7	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	a 29.134
	Sept..	21	2.6	18.22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	June..	16	2.7	21.27	68.12	72	5.64	3.53	8.15	39	3.67	b 4.40	7.4	.617	.135	a 29.105
	Av.	11	2.9	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137
Less than Av. Per Cent of Cholera Mo. bus.	May	7	3.2	a 21.82	a 64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
	Oct.	6	2.8	a 18.28	45.80	b 76	3.06	1.91	9.77	b 50	b 3.29	b 3.43	b 9.0	b .815	b .131	a 29.153
	Nov.	4	2.9	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
	Apr.	3	2.5	a 19.39	a 51.33	b 74	a 3.69	2.31	9.37	b 52	4.07	4.48	11.2	.901	b .176	a 29.161
	Jan.	3	4.0	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
	Feb.	2	6.8	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Mar.	2	4.2	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149
	Dec.	2	4.2	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214
DYSENTERY																
More than Av. Per Cent of Dysentery.	Aug....	33	2.8	19.93	69.61	b 78	6.40	4.00	7.68	41	b 4.00	b 4.37	8.0	.734	.156	29.152
	Sept....	24	3.1	18.22	58.57	b 80	4.66	2.91	8.77	b 61	3.15	3.54	9.2	b .956	b .232	a 29.129
	July ..	21	2.8	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	a 29.134
	Oct....	13	3.0	18.28	a 45.80	76	a 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153
Av.	11	3.0	17.48	47.89	77	3.65	2.28	9.40	56	3.71	4.16	9.8	.884	.206	29.137	
Less than Av. Per Cent of Dysentery.	June....	11	2.5	a 21.27	a 63.12	b 72	a 5.64	3.53	8.15	b 39	b 3.67	4.40	b 7.4	b .617	b .135	29.105
	Apr.	6	3.0	a 19.39	a 51.33	b 74	a 3.69	2.31	9.37	b 52	4.07	4.48	11.2	.901	b .176	a 29.161
	May....	5	3.3	a 21.82	a 64.77	b 72	a 5.03	3.14	8.54	b 41	3.83	4.53	10.3	b .804	b .186	29.078
	Jan.	4	4.0	11.49	24.88	83	1.54	.96	10.72	79	3.91	b 4.04	9.8	1.051	.226	a 29.208
	Feb.	4	3.5	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979
	Mar.	3	6.3	16.48	28.11	b 76	1.56	.98	10.70	b 52	4.20	4.64	12.0	1.075	.286	a 29.149
	Nov.	3	2.9	14.64	38.70	81	2.60	1.63	10.05	77	b 3.45	b 3.95	12.3	1.012	.254	a 29.175
	Dec.	3	2.7	13.12	29.24	82	1.75	1.09	10.59	71	3.78	4.29	b 9.1	.981	.235	a 29.214

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

† An exception to Proposition 1, relating to Cholera Morbus and Dysentery, on page 137.

‡ An exception to Proposition 2, relating to Cholera Morbus and Dysentery, on page 137.

COLD-WEATHER DISEASES.

EXHIBIT XXV.—Summary relative to Propositions contained in Exhibits X., XII., XIV., XV., XVI., etc. (pages 125-133), concerning Relations by Months, in 1896, between Greater or Less than Usual Prevalence of Diseases Named, and Certain given Coincident Climatic Conditions.

Diseases.	Months (inclusive) in which Diseases named were more than Usually Prevalent in 1896.	Months (inclusive) in which Diseases named were less than Usually Prevalent in 1896.	For the 12 months of the year 1896. Number of Months in which Propositions hold true *										
			That in Months when Diseases named were more than usually prevalent the conditions named below were Greater than usual, and in Months when Less than usually prevalent these condi- tions were Less than usual †										That in Mos. when Diseases named were more than us ally preva- lent the condi- tions named be- low were Lower than usual, and in Mos. when the Diseases were Less than usually preva- lent these condi- tions were higher than usual. ‡
			Relative Humidity.	Av. Per Cent of Cloudiness.		Ozone.		Atmos- pheric Pressure.		Range.		Average Temperature.	Av. Daily Range of Temp. †
				Day.	Night.	Velocity of Wind.	Monthly.	Av. Daily.				Av. Daily Atmospheric Pres- sure. ‡	Absolute Humidity.
Bronchitis	Jan.-Apr., Oct.- Dec.	May-Sept.....	7	8	8	6	9	10	9	11	10	2	11
Pneumonia.....	Jan.-Apr., Dec.	May-Nov.....	8	8	10	8	9	10	9	9	10	4	9
Membran. croup...	Jan., Nov., Dec.	Feb.-Oct.....	9	10	6	4	7	8	9	9	10	4	9
Diphtheria.....	Sept.-Dec.....	Jan.-Aug.....	8	9	3	3	5	7	8	8	7	5	8
Tonsillitis.....	Jan.-Apr., Oct.- Dec.	May-Sept.....	7	8	8	6	9	10	9	11	10	2	11
Influenza	Jan.-Apr., Nov., Dec.	May-Oct.	8	9	9	7	10	11	10	10	11	3	10
Scarlet fever.....	Jan.-Apr., Dec.	May-Nov.....	8	8	10	8	9	10	9	9	10	4	9
Rheumatism.....	Jan.-May, Nov., Dec.	June Oct.	7	8	10	8	11	10	9	9	10	4	9
Neuralgia.....	Jan.-Apr., Oct.- Dec.	May-Sept.....	7	8	8	6	9	10	9	11	10	2	11
Consumption, pul..	Feb., May, June, Aug., Sept.	Jan., Mar., Apr., July, Oct.-Dec.	7	6	6	8	6	4	5	3	4	10	3
Pleuritis	Jan.-Apr., Nov., Dec.	May-Oct.	8	9	9	7	10	11	10	10	11	3	10
Average disease....	Jan.-Mar.....	Apr.-Dec.....	7	8	8	6	9	8	9	9	10	6	9

* The figures in each of these 11 columns show for how many months out of the twelve months in 1896, the proposition named over the column holds true thus, concerning bronchitis, the proposition relative to average daily range of temperature held true in ten months out of the twelve; that relative to average temperature, in eleven out of twelve, etc.

† The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893, Annual Report for 1894. These propositions are printed on pages 122 and 123 of this Report.

WARM-WEATHER DISEASES.

EXHIBIT XXVI.—*Summary Relative to Propositions contained in Exhibits XIX., XXI., etc., (pages 133-144, etc.), concerning Relations, by Months in 1896, between Greater or Less than Usual Prevalence of Diseases Named, and Certain given Coincident Climatic Conditions.*

Diseases.	Months (inclusive) in which Diseases named were more than Usually Prevalent in 1896.	Months (inclusive) in which Diseases named were less than Usually Prevalent in 1896.	For the 12 Months of the Year 1896. Number of Months in which Propositions hold true,*											
			That in Months when Diseases named were More Prevalent than Usual the Condi- tions named be- low were Higher than Usual, and in Months when the Diseases were less Prevalent than Usual these Conditions were lower than Usual.	That in Months when Diseases named were More Prevalent than Usual the Conditions named below were less than Usual, and in Months when the Diseases were less Prevalent than Usual these Conditions were Greater than Usual.										
				Average Temperature.	Av. Daily Range of Temp.	Absolute Humidity.	Av. Daily Atmospheric Pressure.	Atmos- pheric Pressure.		Relative Humidity.	Av. Per Cent of Cloudiness.	Ozone.		Velocity of Wind.
								Range.				Day.	Night.	
								Monthly.	Av. Daily.					
Diarrhea.....	June-Oct.	Jan.-May, Nov., Dec.	9	10	9	4	10	9	7	8	10	8	11	
Cholera infantum ..	June-Sept.	Jan.-May, Oct.- Dec.	10	9	10	3	9	8	6	7	9	7	10	
Intermittent fever.	Apr.-Oct.	Jan.-Mar., Nov., Dec.	11	12	11	4	10	11	9	10	8	6	9	
Remittent fever....	Jan., July-Oct..	Feb.-June, Nov., Dec.	7	8	7	6	8	7	5	6	8	10	10	
Typhoid fev. (ent.)	Aug.-Nov.	Jan.-July, Dec..	6	7	6	7	7	6	4	5	9	9	8	
Typho-mal. fever ..	Aug.-Oct.	Jan.-July, Nov., Dec.	7	8	7	6	8	7	5	6	8	8	9	
Measles	Mar.-July	Jan., Feb., Aug.- Dec.	9	8	9	4	8	9	11	10	6	4	5	
Whooping-cough....	Jan.-Apr., June, July	May, Aug.-Dec.	6	5	6	5	5	6	8	7	5	5	5	
Cholera morbus....	June-Sept.	Jan.-May, Oct.- Dec.	10	9	10	3	9	8	6	7	9	7	10	
Dysentery	July-Oct.	Jan.-June, Nov., Dec.	8	9	8	5	9	8	6	7	9	9	10	

* The figures in each of these 11 columns show for how many months out of the twelve months in 1896 the proposition named over the column holds true; thus, concerning diarrhea, the proposition relative to average daily range of temperature held true in ten months out of the twelve; that relative to absolute humidity nine months out of the twelve, etc.

TOTAL SICKNESS—AVERAGE DISEASE.

“Average disease” is an average of the tabulated diseases reported present on all the cards received and compiled at this office during the year. It is probably equivalent to the actual sickness from all diseases printed on the report cards, and probably represents very nearly the average sickness from all the diseases in the State. A sample of the re-

port cards on which diseases are reported to this office is shown on the third page of this Article. Twenty-eight diseases are printed on the cards. In 1896 there were 3,940 of these card reports received. On some of the cards only one or two diseases were reported present and on others more. Had each disease (printed on this card, and only the twenty-eight thus named) been reported present on every card received at this office, there would have been 110,320 reports of diseases present. (This is the product of 3,940 reports received multiplied by 28, the number of diseases printed on the cards, or 100 per cent of the possible disease reports.) There were actually present on the cards received at this office only 19,443 disease reports which $19,443 \div 110,320$ of the possible disease reports that might have been present, is 18 per cent. This 18 per cent represents the actual sickness in the State from the tabulated diseases reported present, or in other words the sickness from "average disease." (See Diagram 4, on a preceding page.)

Exhibit XXVII. serves to indicate the probable actual sickness in the State from the tabulated diseases in each year from 1877 to 1896. It compares the sickness in 1896 by months with the sickness by months in each of the nineteen years, 1877-1895. It also compares the sickness in 1896, by months with the sickness, by months, in each of the ten years, 1886-1895. This last comparison is made because of the change in the plan of reports, which occurred in May, 1885, since which time the plan has been to have reported only the sickness actually observed by the physician who reports. Previous to May, 1885, some reported sickness that, by conference with other physicians, they believed to have occurred. Since May, 1885, the subject is placed upon a scientific basis.

By Exhibit XXVII., it will be seen that the sickness reported in 1896, was, for the year, and for each month of the year, considerably less than the average reported for the nineteen years, 1877-1895. That exhibit also shows that the sickness reported in Michigan for the year 1896, and for each month was less than the average for the ten years, 1886-1895.

On this subject Exhibits A and B, on preceding pages, and the accompanying remarks, may be studied in connection with the exhibits and remarks in this part of this article. In Exhibit A, the order of prevalence of each disease, including the "Average Disease," is shown as it appears after taking account of the order of prevalence of each disease in the places where it was present, and also the per cent of all reports received on which that disease was reported.

RELATIONS OF TOTAL AMOUNT OF SICKNESS TO METEOROLOGICAL CONDITIONS.

PROPOSITION I.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the 28 diseases tabulated (in tables 1 to 4 inclusive on preceding pages) as were reported present, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **less** than the average for the year. In Exhibit XXVIII., the letter *a* marks exceptions to this proposition for the year 1896.

EXHIBIT XXVII.—SICKNESS FROM AVERAGE DISEASE, 1877-96.—*By Year and Months for each of the twenty Years, 1877-96, Stating on an average for such of the 28 diseases tabulated as were reported present, what Per Cent of the Weekly Reports received stated presence of the Diseases, and Comparing the Average Per Cents for Months in 1896, with the Averages for Corresponding Months in the nineteen years, 1877-95; also comparing the Averages for the Months in 1896 with the Averages for corresponding months in the ten Years, 1886-95.**

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 19 years, 1877-95.....	26	27	27	28	27	25	24	26	28	29	27	26	26
Average 10 years, 1886-95.....	23	24	24	25	24	23	21	22	24	24	23	22	23
1877.....	28	27	28	26	24	24	23	26	29	31	30	30	30
1878.....	30	30	30	31	29	28	26	28	32	35	34	30	32
1879.....	33	35	36	36	35	30	30	32	37	36	34	34	33
1880.....	32	32	32	32	31	30	31	34	36	35	32	30	31
1881.....	33	34	34	32	35	31	30	34	37	36	35	32	31
1882.....	30	31	30	30	30	29	28	28	30	34	32	31	29
1883.....	30	30	31	33	33	31	29	29	32	32	29	29	28
1884.....	29	28	29	30	28	23	29	31	34	34	33	30	29
1885.....	26	29	29	30	28	25	24	26	27	27	26	26	26
1886.....	26	26	26	28	27	26	23	26	27	28	25	25	25
1887.....	25	26	27	28	26	25	24	27	29	26	25	24	24
1888.....	24	24	26	27	26	24	23	22	25	25	23	22	23
1889.....	23	23	22	24	23	23	21	24	27	28	26	23	22
1890.....	25	26	26	25	26	25	23	24	27	26	25	25	27
1891.....	25	27	27	27	27	25	22	23	26	25	24	23	24
1892.....	21	26	25	24	24	20	19	19	22	23	22	20	23
1893.....	20	21	21	20	20	19	18	18	21	21	20	20	20
1894.....	20	20	19	20	20	19	18	18	20	22	20	19	19
1895.....	20	20	21	22	22	19	18	19	20	19	19	17	18
1896 (Diagram 4, page 135).....	18	19	19	20	17	16	16	17	18	18	17	17	17
In 1896 Less than Average 1877-95.....	2	8	8	8	10	9	8	9	10	11	10	9	9
In 1896 Less than Average 1886-95*.....	---	5	5	5	7	7	5	5	6	6	6	5	6

* This last comparison is made because of the change in the plan of making the reports, which occurred in May, 1885, as explained on page 84.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the twenty-eight diseases tabulated as were reported present, the average daily temperature, the average daily range of temperature†, the absolute humidity of the atmos-

† The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893, Annual Report for 1894.

phere, and the average daily pressure of the atmosphere††, were less than the average for the year; and in months when less than the average per cent of reports stated the presence of said diseases those conditions were greater than the average for the year. In Exhibit XXVIII., shown below, the letter *b* marks exceptions to this proposition for the year 1896.

What per cent of the weekly reports received in 1896 (on an average for such of the tabulated diseases as were reported present) stated presence of the diseases is graphically represented by months in Diagram 4.

Exhibit XXVIII., continued for a series of years, should show what meteorological conditions are on the whole most conducive to health in Michigan, and what are most to be guarded against by residents of Michigan.

EXHIBIT XXVIII.—AVERAGE DISEASE.—*Stating for the Year and for each Month of the Year 1896, what Per Cent of the Weekly Reports of Sickness Stated Presence of Average Disease and what were the Meteorological Conditions as observed at Stations in Michigan.**

AVERAGE DISEASE.				Tempera- ture, F.		Humidity of Air, Av. of 33 Daily Observations		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		Atmospheric Pres- sure, Inches. Reduced to 32° F.							
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present,†, ‡.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.		Absolute — Grains of Vapor in a Cu- bic Foot of Air.		Inhaled,||	Exhaled in ex- cess of that Inhaled,||	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.		Night Observation, 9 P. M. to 7 A. M.		Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		
					Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions,**	Average Pressure.												
More than Av. Per Cent of Av. Diseases.	{ Mar. Jan. Feb.	20	3.3	16.48	28.11	<i>a</i> 76	1.56	.98	10.70	<i>a</i> 52	4.20	4.64	12.0	1.075	.286	<i>b</i> 29.149			
		19	3.0	11.49	24.88	83	1.54	.96	10.72	79	3.91	<i>a</i> 4.04	9.8	1.051	.226	<i>b</i> 29.208			
		19	3.2	15.56	24.57	79	1.50	.94	10.74	65	4.12	4.61	11.8	1.169	.307	28.979			
Av.		18	2.7	17.48	47.89	77	3.65	2.25	9.40	56	3.71	4.16	9.8	.884	.206	29.137			
Less than Average Per Cent of Average Disease.	{ Aug. Sept. Oct. Nov. Dec. July Apr. May June	18	2.7	19.93	69.61	<i>a</i> 78	6.40	4.00	7.68	41	<i>a</i> 4.00	<i>a</i> 4.37	8.0	.734	.156	29.152			
		18	2.6	18.22	58.57	<i>a</i> 80	4.66	2.91	8.77	<i>a</i> 61	3.15	3.54	9.2	<i>a</i> .956	<i>a</i> .232	<i>b</i> 29.129			
		17	2.5	18.28	645.80	76	<i>b</i> 3.06	1.91	9.77	50	3.29	3.43	9.0	.815	.131	29.153			
		17	2.6	<i>b</i> 14.64	638.70	<i>a</i> 81	<i>b</i> 2.60	1.63	10.05	<i>a</i> 77	3.45	3.95	<i>a</i> 12.3	<i>a</i> 1.012	<i>a</i> .254	29.175			
		17	2.7	<i>b</i> 13.12	629.24	<i>a</i> 82	<i>b</i> 1.75	1.09	10.59	<i>a</i> 71	<i>a</i> 3.75	<i>a</i> 4.29	9.1	<i>a</i> .981	<i>a</i> .235	29.214			
		17	2.6	19.50	71.02	76	6.43	4.02	7.66	48	3.03	3.62	7.6	.499	.148	<i>b</i> 29.134			
		17	2.6	19.89	51.33	74	3.69	2.31	9.37	52	<i>a</i> 4.07	<i>a</i> 4.48	<i>a</i> 11.2	<i>a</i> .901	.176	29.161			
	16	2.6	21.82	64.77	72	5.03	3.14	8.54	41	<i>a</i> 3.83	<i>a</i> 4.55	<i>a</i> 10.3	.804	.186	<i>b</i> 29.078				
	16	2.5	21.27	68.12	72	5.64	3.53	8.15	39	3.67	<i>a</i> 4.40	7.4	.617	.135	<i>b</i> 29.105				

*, †, ‡, §, ||, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Average Disease, on page 123.

b An exception to Proposition 2, relating to Average Disease, on page 123.

†† This foot-note is on the last preceding page.

COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1896.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD
OF HEALTH.

This paper continues a subject treated for the preceding year on pages 146-137 of the Report of the State Board of Health for the year 1896, and for former years in previous reports.

Whenever information is received at this Office of the outbreak (in any locality in Michigan) of diphtheria, scarlet fever, typhoid fever, consumption, small-pox, measles, German measles (rötheln), whooping-cough, rabies or glanders, a letter is sent to the health officer of the township, city or village in which the disease is reported to be present (if the name of the health officer has been reported to this Office; if not, to the president of the board of health), calling his attention (if the report was not received from him) to the reported existence of the disease within his territory, indicating his duties and powers and the proper measures to be taken in restricting the disease, transmitting documents of instruction with regard to prevention and restriction of the disease, for distribution among the neighbors of families in which the disease is present,* and asking for a report of the methods employed for the restriction of the disease, and the results of efforts for suppressing it, also the number of cases and deaths in each outbreak. In the case of typhoid fever, a printed letter was used (form [162.]) which is reproduced in Part I. of the Report of this Board for 1894, p. lxxxvi. In the case of diphtheria, scarlet fever, and small-pox the letter generally sent during the year 1894 was substantially the same as that printed on pages 251-252 of the Report of the State Board of Health for the year 1884, except that about a dozen questions were

* It is believed that these documents distributed in this manner are doing great good; for the neighbors of the sick are sufficiently alarmed to read the documents, and are thus led to co-operate in stamping out the disease.

Some evidence of the value of this work may be seen further on, in the several articles to which this is an introduction, in tables which show the estimated number of outbreaks of, and cases of sickness from communicable diseases prevented, and lives saved by isolation and disinfection.

In the Report of this Board for the year 1895 (pp. 153-174) in the introduction to the articles on the dangerous communicable diseases, are printed tables and diagrams which show the results of restrictive measures recommended by this Board. In this Report such a summary may be published following the series of papers on the several dangerous communicable diseases.

TABLE 1.—*Number of all places* in Michigan at which Communicable Diseases were reported present, also the number of new places† at which each disease was reported present each week in 1896.*

Weeks ending Saturday—		Diphtheria		Scarlet Fever.		Typhoid Fever.		Measles.		Whooping- cough.		Consump- tion.		Small- pox.	
		*Places.	New Places	Places.	New Places.	Places.	New Places.	Places.	New Places	Places.	New Places	Places.	New Places	Places.	New Places.
January	{ 4	32	6	39	8	47	1	15	4	15	3	199	7	1	0
	{ 11	40	16	37	14	48	14	13	3	18	6	222	22	1	0
	{ 18	38	14	38	10	45	12	18	6	24	12	235	27	1	0
	{ 25	34	5	33	6	41	13	16	5	21	10	240	13	1	0
	{ 1	37	14	36	9	32	6	19	4	17	1	244	5	1	0
February	{ 8	30	12	35	12	24	4	16	2	17	5	243	6	3	0
	{ 15	28	12	40	8	21	8	17	4	19	8	243	2	5	3
	{ 22	26	6	36	6	21	3	17	3	19	3	247	12	6	1
	{ 29	21	7	35	7	27	4	18	3	10	1	254	9	5	2
	March	{ 7	23	7	35	11	26	6	25	5	15	2	240	7	7	0
{ 14		21	8	38	6	17	5	28	6	14	3	235	7	6	2
{ 21		19	4	36	12	19	6	33	15	8	5	239	9	6	0
{ 28		18	4	35	13	23	7	32	6	13	2	242	10	6	0
April		{ 4	16	7	38	10	17	4	34	8	10	3	247	7	4	0
	{ 11	23	10	37	6	17	9	33	6	6	1	247	4	3	0
	{ 18	27	9	27	7	20	7	36	10	13	2	202	5	4	0
	{ 25	22	11	29	5	16	1	37	7	11	3	198	12	2	0
	{ 2	20	6	27	10	17	2	37	12	12	5	195	3	2	0
May	{ 9	24	6	27	3	15	8	35	14	13	1	204	6	1	0
	{ 16	19	9	22	11	22	7	34	10	10	6	205	20	1	0
	{ 23	21	13	31	8	25	8	37	8	13	2	206	9	0	0
	{ 30	19	7	29	8	15	3	37	6	19	9	204	3	0	0
June	{ 6	19	6	23	8	12	3	39	13	11	2	203	8	0	0
	{ 13	17	7	29	4	21	8	34	7	16	5	205	5	0	0
	{ 20	13	1	27	7	22	11	45	7	22	5	207	3	0	0
	{ 27	16	1	28	15	24	6	55	13	26	10	203	3	0	0
July	{ 4	11	3	19	4	25	8	44	17	21	3	207	5	0	0
	{ 11	11	2	19	2	34	7	38	10	18	4	210	3	0	0
	{ 18	8	2	23	6	35	13	18	6	13	3	210	5	0	0
	{ 25	12	4	25	7	42	12	16	4	21	8	212	5	0	0
	{ 1	17	6	24	4	51	22	20	6	16	7	213	12	0	0
August	{ 8	19	9	22	5	49	18	20	8	15	7	216	3	0	0
	{ 15	20	7	20	3	55	15	18	2	15	4	217	7	0	0
	{ 22	15	2	17	1	51	21	13	2	13	4	217	2	0	0
	{ 29	16	3	16	4	59	20	3	1	8	4	217	1	0	0
September	{ 5	22	5	27	6	73	22	3	0	11	1	215	1	0	0
	{ 12	21	7	27	9	83	18	3	0	12	4	219	3	0	0
	{ 19	27	7	28	6	87	29	4	1	11	5	221	1	0	0
	{ 26	32	8	25	3	85	28	5	1	14	3	224	3	0	0
	{ 3	37	11	23	6	81	16	8	3	13	7	228	4	0	0
October	{ 10	38	9	26	7	79	17	7	6	15	1	228	3	0	0
	{ 17	34	8	25	3	67	26	10	0	11	5	229	3	0	0
	{ 24	34	6	21	6	69	14	9	4	15	4	230	2	0	0
	{ 31	41	12	20	5	60	14	13	5	12	1	231	3	0	0
	November	{ 7	42	8	23	5	47	5	11	3	13	3	230	0	0	0
{ 14		44	12	27	8	39	8	13	0	10	2	228	2	0	0
{ 21		42	11	31	10	44	9	21	12	10	2	227	2	0	0
{ 28		46	11	32	6	34	9	23	7	6	2	223	0	0	0
December		{ 5	50	13	35	10	36	8	18	6	12	4	202	4	0	0
	{ 12	55	6	40	13	34	14	14	5	14	6	195	7	0	0
	{ 19	56	24	50	8	32	8	17	3	19	5	183	12	0	0
	{ 26	57	12	45	12	32	8	20	6	22	3	188	5	0	0
	{ 2	52	7	49	8	33	9	22	8	19	4	190	8	0	0
Average number of places per week..		28	8	30	7	39	11	22	6	15	4	219	6	1	.15

* The number of "Places" are copied from the weekly bulletins "Health in Michigan" issued every Wednesday, and include all places at which the several diseases were reported present up to and including the Wednesday morning following the calendar week for which each bulletin is issued. Therefore they may really represent ten days, each week lapping over to near the middle of the next week. "New Places" are included in these numbers.

† The numbers in the first column, "Places," are compiled from the data in card-reports for the sickness statistics, the outbreak reports of communicable diseases, and the weekly reports of communicable diseases.

‡ The "New Places" are those from which the specified diseases were first reported during the calendar week specified in each bulletin. They are compiled from the same sources as are the numbers in the first column of this table and from newspaper reports. Neither of the columns of this table contain all the places at which, later, by the "final" and "annual" reports, the diseases were found to have been present.

added, and in the case of measles a slightly modified form of the same letter was used. With this letter in each instance, there was sent a blank form (L) for the notice of the first case of a dangerous communicable disease, and a blank form (M) for weekly reports during the continuance of the disease. After the outbreak was over, there was sent a blank form (K) or (O) for special final report. Blanks (L) and (M) now in use are substantially the same as those printed on pages 253-254 of the Report for 1884. The blank (K) for final report is printed on pages xiii-xiv of the Report of this Board for 1888; but the present blank is more complete. The blank (O) is for typhoid fever, and was first used in September, 1890. Since that date it has been modified; as at present used it is printed on pages 149-150 of the Report of this Board for 1895.

The information contained in the above-mentioned blanks and those supplied to health officers and clerks of townships, cities and villages, for their annual reports, when filled and returned to this Office by the health officers of localities where dangerous communicable diseases have existed, together with other correspondence in regard to outbreaks of such diseases, are the bases on which the various statements made in this article are founded.

It is probable that every case of small-pox is reported to the Secretary of the State Board of Health; but that cannot yet be said of any other of the diseases in Table 1. Named in the order of most complete reports, probably these communicable diseases would be arranged as follows: Small-pox, scarlet fever, diphtheria, typhoid fever, measles, consumption.

Some of the Purposes of this Compilation.

The object in having the data contained in the various reports received at the office of the Secretary compiled, tabulated and published is two-fold: First, that facts relative to the ways whereby dangerous communicable diseases are spread in Michigan, and how they are sometimes restricted, and other useful facts, may be submitted to the people of the State, knowledge of which, it is hoped, will enable them to avoid or combat such diseases; and second, by the collation of such data to aid in the progress of sanitary science, especially in as far as it bears on the study of the cause and prevention of dangerous communicable diseases in Michigan.

In furtherance of these objects, the attempt has been made in this as in previous Reports to publish useful information relative to dangerous communicable diseases in this State, on the following points:—(1) The diseases which cause the most sickness and deaths; (2) To what extent those diseases prevail; (3) The methods of introduction and spread of those diseases; (4) The period of incubation of each of those diseases; (5) The average duration of each disease after contraction; (6) The season of the year at which each of such diseases is most prevalent and likely to be contracted; (7) The age at which persons are most likely to contract each disease; (8) The age at which there is greatest danger of persons dying from each disease; (9) The comparative susceptibility of the sexes to contraction of each disease; (10) The localities in the State where each disease is known to be usually most prevalent; (11) Whether or not

each disease is more prevalent in large centers of population than in the more sparsely populated rural districts; (12) The comparative mortality from each disease; (13) The death-rate and the sickness-rate from each disease; (14) The best measures for the prevention and for the restriction of each disease; (15) Results of efforts made for the prevention and restriction of each disease; (16) The usual vehicles of transmission in each disease; (17) The results of neglect of restrictive measures in outbreaks of each disease; and, (18) The efficacy of isolation and disinfection in each disease.

The increasingly large number of replies received in answer to communications relative to communicable diseases, the general desire manifested by health officers for documents on the restriction of those diseases, and the general care taken to send complete reports to this office, show an increasing interest among the people, and a commendable effort on the part of the local health authorities to have every means employed to prevent the spread of communicable diseases. The number of communications which annually pass to and from this office relative to dangerous communicable diseases, has increased greatly during the last few years.

Persistent efforts of this Board have been directed toward impressing the people of the State with the necessity of adopting restrictive measures,—isolation and disinfection, in outbreaks of communicable diseases.

As intimated above, these efforts have been productive, among the people and health officials of the State, of increased interest in sanitary progress; much, however, is still to be desired in that direction.

Definition of the Term "Outbreak," as Used in this Article.

For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction), died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area.

DIPHTHERIA IN MICHIGAN—YEAR ENDING DECEMBER 31, 1896.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF HEALTH.

During the year ending December 31, 1896, there were reported to the Secretary of the State Board of Health 423 outbreaks of diphtheria in 331 localities in Michigan, which resulted in 4,013 cases and 757 deaths. Notwithstanding the marked improvement which the State Board of Health has succeeded in bringing about both in promptness and accuracy of reports of local health officials to the central office, it is still probable that not all cases of and deaths from diphtheria are yet reported. For the year 1896 there were reported to the Secretary of State 649 deaths from diphtheria, or 108 less than were reported to this Office; and the Secretary of the State Board of Health has estimated that the deaths reported to the Secretary of State should be increased by about 40 per cent to equal the actual number of deaths which occur; according to this estimate, there were about 909 deaths from diphtheria during 1896, in Michigan, instead of 757, as reported to the State Board of Health.

DIPHTHERIA IN 1896, COMPARED WITH PREVIOUS YEARS.

According to Reports made to the Secretary of the State Board of Health.

From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by local health authorities throughout the State to furnish in their reports the information desired by the State Board. These facts, together with the constantly increasing population, make it difficult to determine the exact increase or decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom; and these facts should be borne in mind in referring to Table 1. While the above-mentioned facts might reasonably be expected to produce a constant increase in the reported prevalence of the disease, Table 1 shows that such increase has not occurred. In 1890 there was a marked increase in the prevalence of the disease as compared with the previous two years; but since then, notwithstanding the causes above mentioned, no considerable increase has occurred; and in 1894 there is even shown a very decided decrease in both the prevalence of the disease and the fatality therefrom.

Table 1 also shows that although the number of outbreaks, cases and deaths in 1896 exceed those in 1895, with the exception of the cases, they are less than the average for the 12 years 1884-1895, and that the fatality from this disease in 1896 was less than in 1895, and much less than the average for the above-mentioned 12 year period.

During the year, the outbreaks which occurred in 57 localities in the State continued to prevail in the year 1897. Excluding Springwells township,* Wayne Co., 138 cases and 22 deaths occurred in 1897 but were due to outbreaks which began in 1896. Outbreaks in 22 localities, where occur-

* The outbreak in this locality has existed continually since April, 1896.

red 284 cases and 55 deaths, were present in 1896 but were due to outbreaks which began in 1895.

TABLE 1.—DIPHTHERIA IN MICHIGAN —Numbers of Reported Outbreaks, Localities (in which they Occurred), Cases and Deaths; Average Numbers of Cases and Deaths Per Outbreak, and the Per Cent of Cases which proved fatal, as reported for each of the Fifteen Years, 1882-1896; also Averages of the same for the Twelve Years, 1884-95, and Comparisons of the Facts for 1896 with those for 1895 and with the Averages for the Twelve Years, 1884-95.

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Average Cases per Outbreak.	Reported Deaths.	Average Deaths per Outbreak.	Deaths Per 100 Cases.
1882	-----	163	2,046	-----	495	-----	24.
1883*	-----	125	2,246	-----	543	-----	24.
1884†	362	302	3,915	10.8	905	2.5	23.
1885	467	396	4,018	8.6	964	2.0	24.
1886	550	422	4,244	7.7	982	1.8	23.
1887	466	371	3,382	7.3	825	1.8	24.4
1888	337	283	2,228	6.6	532	1.6	23.9
1889	398	329	3,157	7.9	683	1.7	21.6
1890	442	365	4,206	9.5	1,050	2.4	25.
1891	535	461	4,385	8.2	1,002	1.9	22.8
1892	527	463	4,818	9.1	1,099	2.1	22.8
1893	546	460	4,736	8.7	1,092	2.0	23.1
1894	435	367	3,852	8.9	744	1.7	19.3
1895	401	347	3,433	8.6	708	1.8	20.6
1896	423	331	4,013	9.5	757	1.8	18.9
Average for twelve years, 1884-1895	456	381	3,865	8.5	882	1.9	22.8
Variations in 1896 from 1895	+22	-16	+580	+0.9	+49	=	-1.7
Variations in 1896 from the average for 12 years, 1884-95	-33	-50	+148	+1.0	-125	-.1	-3.9

* The use of the blank form "M" for weekly reports was begun in May, 1883.

† In compiling diphtheria the use of the annual reports of health officers was begun in 1884.

According to Reports made to the Secretary of State.

TABLE 2.—Exhibiting the number of reported deaths from Diphtheria per 100,000 persons living in Michigan in each of the 29 years, 1868-96. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated for intercensal years, by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department, except for the years 1895 and 1896, which was estimated in the Office of the State Board of Health.)

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876	1877.	1878.	1879.	1880.	1881.
Deaths		8.84	7.80	10.22	10.49	15.06	16.44	15.60	14.68	21.36	39.51	59.36	92.55	94.20	122.61
Year.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths.	81.93	56.76	58.53	56.50	58.45	47.78	35.81	41.40	60.46	49.54	46.67	43.50	28.64	26.07	28.03

The foregoing table (2) giving the number of deaths from diphtheria, per 100,000 persons living, reported to the Secretary of State, probably quite accurately represents the annual fluctuations of, but not the total deaths from diphtheria in Michigan during the 29 years, 1868-95. A diagram graphically representing Table 2, for the 26 years, 1868-93, can be seen on page 181 of the Report of this Board for 1895.

Distribution of Diphtheria by Divisions and Counties During 1896.

Table 3 exhibits the distribution of diphtheria in 1896, by divisions of the State; Table 4 and the accompanying map exhibit in slightly different ways, the reported diphtheria, by counties, during the year 1896. The tables exhibit the death-rates as well as the reported number of deaths. The map for 1896, exhibits by counties, the number of localities infected, the number of outbreaks which occurred, and the number of cases and deaths per 10,000 of population.

TABLE 3.—*Exhibiting the Population of Michigan for the year 1896, by tiers of counties (Upper Peninsula as one tier); also the number of cases of and deaths from Diphtheria REPORTED from each of the divisions for 1896, and the number of cases per 10,000 population of each division.*

Counties in Groups, most Northern ones First.	Estimated Population, 1896,*	Reported Cases of Diphtheria, 1896,	Reported Cases per 10,000 of Population,	Reported Deaths from Diphtheria, 1896,	Reported Deaths per 10,000 of Population.
State -----	2,315,517	4,013	17.33	757	3.27
Upper Peninsula -----	219,561	576	26.23	84	3.83
Alger. Mackinac.					
Delta. Chippewa.					
Schoolcraft. Keweenaw.					
Luce. Marquette.					
Houghton. Iron.					
Ontonagon. Menominee.					
Gogebic. Dickinson.					
Baraga. Cheboygan.					
Eleventh tier of counties. Emmet. Presque Isle.	44,907	79	17.59	3	.67
Leelanaw.					
Tenth tier of counties. Antrim.	50,469	83	16.45	8	1.58
Otsego. Alpena.					
Montmorency.					
Ninth tier of counties. Benzie. Crawford.	44,715	81	18.14	17	3.80
G'd. Traverse. Oscoda.					
Kalkaska. Alcona.					
Manistee.					
Eighth tier of counties. Wexford. Ogemaw.	68,430	60	8.77	13	1.90
Missaukee. Iosco.					
Roscommon.					
Seventh tier of counties. Mason. Gladwin.	161,297	350	21.70	66	4.09
Lake. Bay.					
Osceola. Huron.					
Clare. Arenac.					
Sixth tier of counties. Oceana.	94,010	112	11.91	20	2.13
Newaygo. Midland.					
Mecosta.					
Isabella.					
Fifth tier of counties. Muskegon.	251,350	393	15.64	57	2.27
Montcalm. Tuscola.					
Gratiot. Sanilac.					
Saginaw.					
Fourth tier of counties. Ottawa.	389,922	411	10.54	64	1.64
Kent. Shiawassee.					
Genesee.					
Clinton. Lapeer.					
Allegan. St. Clair.					
Barry. Livingston.	232,834	182	7.82	34	1.46
Eaton. Oakland.					
Ingham. Macomb.					
Second tier of counties. Van Buren.	525,875	1,428	27.16	339	6.45
Kalamazoo. Washtenaw.					
Calhoun. Wayne.					
Jackson.					
First tier of counties. Berrien.	232,233	258	11.11	52	2.24
Cass. Hillsdale.					
St. Joseph. Lenawee.					
Branch. Monroe.					

* Population estimated by average annual increase, arithmetical method, based on U. S. Census of 1890 and the State Census of 1894, computed in the Office of the State Board of Health.

TABLE 4.—Numbers of Cases and Deaths reported from Diphtheria per 10,000 persons living in each county in Michigan during the year 1896. (Compiled from reports of health officers, clerks, etc.)

Counties.	*Estimated Population for 1896.	Number of reported		Number per 10,000 population, of		Counties.	*Estimated Population for 1896.	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,315,517	4,013	757	17.33	3.27	Keweenaw Lake	2,693 5,593	1	1	1.79	1.79
Alcona	5,423					Lapeer	28,712	47	6	45.72	5.84
Alger	1,459					Leelanau	10,281	33	10	6.79	2.06
Allegan	39,303	23	3	5.85	.76	Livingston	48,588 20,227	2	1	.99	.49
Alpena	18,785	14	0	7.45	.00	Luce	2,294				
Antrim	13,434					Mackinac	6,941				
Arenac	7,573	4	0	5.28	.00	Macomb	32,674	92	19	28.16	5.82
Baraga	4,830					Manistee	27,056	51	13	18.85	4.80
Barry	23,657	8	2	3.38	.85	Marquette	38,972	188	31	48.24	7.95
Bay	63,750	144	26	22.59	4.08	Mason	19,440				
Benzie	9,476	1	1	1.06	1.06	Mecosta	21,245	2	0	.94	.00
Berrien	47,810	119	23	24.89	4.81	Menominee	24,345	128	19	52.58	7.80
Branch	25,913	24	7	9.26	2.70	Midland	14,499	88	15	60.69	10.35
Calhoun	49,458	49	12	9.91	2.43	Missaukee	7,909	1	0	1.26	.00
Cass	21,288	11	2	5.17	.94	Monroe	33,603	43	5	12.80	1.49
Charlevoix	11,702					Montcalm	34,919	52	5	14.89	1.43
Cheboygan	14,857	66	3	44.42	2.02	Montmorency	2,914	22	2	75.49	6.86
Chippewa	16,974	31	8	18.26	4.71	Muskegon	35,980	154	23	42.80	6.39
Clare	8,185	3	1	3.67	1.22	Newaygo	18,449	1	1	.54	.54
Clinton	26,139	4	1	1.53	.38	Oakland	43,392	27	5	6.22	1.15
Crawford	2,584	20	3	77.40	11.61	Oceana	17,050	6	1	3.52	.59
Delta	21,228	4	1	1.88	.47	Ogemaw	5,666	1	0	1.76	.00
Dickinson	15,074	15	4	9.95	2.65	Ontonagon	8,432				
Eaton	32,880	28	3	8.52	.91	Osceola	17,398	23	4	13.22	2.30
Emmet	11,825	2	0	1.69	.00	Oscoda	1,757	17	3	96.70	17.01
Genesee	41,115	48	4	11.67	.97	Otsego	5,055				
Gladwin	5,246					Ottawa	40,946	57	6	13.92	1.47
Gogebic	14,542	3	0	2.06	.00	Presque Isle	6,523	11	0	16.86	.00
Gr'd Traverse	19,595	34	7	17.35	3.57	Roscommon	1,469				
Gretiot	28,830	17	2	5.90	.69	Saginaw	81,634	99	13	12.13	1.59
Hillsdale	30,078	21	3	6.98	1.00	Sauilac	34,623	26	8	7.51	2.31
Houghton	48,568	205	20	42.21	4.12	Schoolcraft	7,782	2	1	2.57	1.29
Huron	34,112	175	34	51.30	9.97	Shiawassee	33,805	60	5	17.75	1.48
Ingham	40,701	2	1	.49	.25	St. Clair	55,429	104	21	18.76	3.79
Ionia	35,830	8	1	2.23	.28	St. Joseph	24,953	7	2	2.81	.80
Iosco	10,898					Tuscola	35,364	45	6	12.72	1.70
Iron	5,427					Van Buren	31,318	7	3	2.24	.96
Isabella	22,767	15	3	6.59	1.32	Washtenaw	44,159	10	0	2.26	.00
Jackson	47,287	85	37	17.98	7.82	Wayne	310,135	1,162	283	37.47	9.13
Kalamazoo	43,448	115	4	26.47	.92	Wexford	15,432	7	0	4.54	.00
Kalkaska	5,880	9	3	15.31	5.10						
Kent	127,946	130	26	10.16	2.03						

* Population estimated by average annual increase, arithmetical method, based on U. S. Census of 1890 and the State Census of 1894; computed in the Office of the State Board of Health.

DISTRIBUTION OF DIPHTHERIA IN MICHIGAN IN 1896.

BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.



S. = Localities; O. = Outbreaks; C. = Cases per 10,000 population; D. = Deaths per 10,000 population.
[PLATE 923.]

[PLATE 923.]

The percentages shown on the above map do not exactly agree in some instances with the percentages in the table (4), as but one decimal place could be used on the map, while in the table the percentages are carried out to the second decimal place.

Sickness-rates from Diphtheria in 1896.

Table 3 exhibits the latitudinal distribution of diphtheria throughout the State, by tiers of counties. All the counties of the Upper Peninsula are considered as one tier.

This table shows that the lowest sickness-rate (7.82 per 10,000 population) was in the third tier of counties; that, the next lowest sickness-rate

(8.77 per 10,000 population) was in the eighth tier of counties; that, the highest sickness-rate (27.16 per 10,000 population) was in the second tier of counties; and that, the next highest sickness-rate (26.23 per 10,000 population) was in the Upper Peninsula. Other tiers of counties where the sickness-rate was above the average for the State were the seventh, ninth, and eleventh tiers.

In the second tier of counties, the city of Detroit gave a sickness-rate of 30.84 per 10,000 population, and the tier, excluding the city of Detroit, gave a sickness-rate of 23.13 per 10,000 population. In the fourth tier of counties, the city of Grand Rapids gave a sickness-rate of 9.11 per 10,000 population, and the tier, exclusive of Grand Rapids, gave a sickness-rate of 10.97 per 10,000 population.*

Table 4 shows that the sickness-rate for the whole State during the year was 17.33 per 10,000 inhabitants. It also shows that the highest sickness-rate was in Oscoda county, 96.70 per 10,000 population. Other counties where the sickness-rate was greatly in excess of the sickness-rate for the State are:—Crawford, 77.40; Montmorency, 75.49; Midland, 60.69; Menominee, 52.58; and Huron, 51.30. The lowest sickness-rate, in Table 4, is shown to have been in Ingham county, .49 of one case per 10,000 population. Other counties where the sickness-rates were much below the sickness-rate for the State are:—Newaygo, .54; Mecosta, .94; Livingston, .99; Benzie, 1.06; Missaukee, 1.26; Clinton, 1.53; Emmet, 1.69; Ogemaw, 1.76; Lake, 1.79; and Delta, 1.88.

Death-rates from Diphtheria Reported as having Occurred in 1896.

The last columns of Tables 3 and 4 supply data showing the death-rates from diphtheria by divisions, and for each county in the State. By these tables it may be seen that the death-rate for the whole State per 10,000 inhabitants was 3.27.

Table 3 shows the greatest death-rate to have been in the second tier of counties.

Table 4 shows that the greatest death-rate from this disease during the year (17.01 deaths per 10,000 of population) was in Oscoda county. Other counties where the death-rates were much above the average death-rate for the State, were:—Crawford, 11.61; Midland, 10.35; Huron, 9.97; Wayne, 9.13; Marquette, 7.95; Jackson, 7.82; Menominee, 7.80; Montmorency, 6.86; Muskegon, 6.39; Leelanaw, 5.84; Macomb, 5.82; Kalkaska, 5.10. The lowest death-rate in counties where deaths occurred was in Ingham county, 0.25 per 10,000 inhabitants. Other counties where the death-rates were far below the average death-rate for the State, were:—Ionia, 0.28; Clinton, 0.38; Delta, 0.47; Livingston, 0.49; Newaygo, 0.54; Oceana, 0.59; Gratiot, 0.69; Allegan, 0.76; St. Joseph, 0.80; Barry, 0.85; Eaton, 0.91; Kalamazoo, 0.92; Cass, 0.94; Van Buren, 0.96; Genesee, 0.97. From the following named sixteen counties: Alcona, Alger, Antrim, Baraga, Charlevoix, Gladwin, Iosco, Iron, Keweenaw, Lapeer, Luce, Mackinac, Mason, Ontonagon, Otsego, and Roscommon, with a population aggregating 133,455, no diphtheria was reported during the year. From Alpena, Arenac, Emmet, Gogebic, Mecosta, Missaukee, Ogemaw, Presque

* The reports of the city Boards of Health of Detroit and Grand Rapids state the population of those cities for the year, 1893, 275,000 and 90,000 respectively, and the cases of sickness from diphtheria reported to this office from those cities were 848 and 82 respectively.

Isle, Washtenaw, and Wexford, there was an aggregate of fifty-five cases of diphtheria reported with no fatalities.

The proportionate fatality or "case mortality."

The proportionate fatality or "case mortality" from diphtheria in 1896, i. e., the proportion of reported cases which proved fatal, was, for the whole State, 18.9 per cent or one death to 5.29 cases.

The case mortality for the counties may be stated as follows: Three counties, Benzie, Lake, and Newaygo, each reported one case which was fatal, making the highest (100.00) per cent of case mortality. Ingham, Livingston, and Schoolcraft, each reported two cases, one of which (in each instance) was fatal, thus giving a case mortality of 50 per cent for each of those counties. Jackson, considering the large number of cases (85 cases, 37 of which were fatal), gave a high (43.53) per cent of case mortality. Van Buren gave a case mortality of 42.86 per cent. Lenawee, Sanilac, Clare, and Kalkaska gave case mortalities which varied from 30.30 to 33.33. Isabella, Kent, St. Clair, Grand Traverse, Macomb, Wayne, Calhoun, Barry, Clinton, Delta, Manistee, Chippewa, Dickinson, St. Joseph, and Branch (15 counties), gave case mortalities which varied from 20.00 to 29.17 per cent. Eaton, Ottawa, Tuscola, Monroe, Gratiot, Ionia, Leelanau, Allegan, Saginaw, Hillsdale, Menominee, Muskegon, Crawford, Marquette, Oceana, Midland, Osceola, Bay, Cass, Oakland, Berrien, and Huron (23 counties) gave case mortalities which varied from 10.53 to 19.43 per cent. Genesee, Shiawassee, Montmorency, Montcalm, and Houghton (5 counties) gave case mortalities which varied from 8.33 to 9.76 per cent. Cheboygan gave a case mortality of 4.55 per cent, and Kalamazoo, with 115 cases and 4 deaths, gave the lowest case mortality, 3.48 per cent.

TABLE 5.—*Exhibiting the numbers of outbreaks and cases of and deaths from diphtheria which occurred in the cities, villages, and townships of Michigan in 1896; and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages, and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Classes of Political Divisions and Numbers of each class of Divisions.	Popula- tion.*	Health jurisdictions.	Outbreaks in :			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 10,000 Population.				
			Localities		No. of				Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Cases.	Deaths.
			No. of	Per cent of all local- ities.									
State (83 counties)	2,315,517	1,592	331	21	423	4,013	757	19	17.33	3.27			
Cities (77)	885,388	78	46	59	74	2,043	403	20	23.07	4.59			
Villages (298)	246,869	298	60	20	65	270	51	19	10.94	2.07			
Townships (1,216)	1,183,260	1,216	225	19	284	1,700	300	18	14.37	2.54			

From the data in above table it may be observed that 59 per cent of the cities, 20 per cent of the villages, and 19 per cent of the townships were infected with diphtheria. But the average population of the cities is

* Estimated by arithmetical method in the Office of the State Board of Health.

nearly fourteen times the average population of the villages.* The lowest case-rate (10.94) and death-rate (2.07) occurred in the villages; the highest case-rate (23.07) and death-rate (4.59) occurred in the cities; being over twice as great as in the villages. The lowest fatality (18 per cent) occurred in the townships, and the highest (20 per cent) occurred in the cities.

Diphtheria in Each Month of the Year, 1896.

TABLE 6.—*Exhibiting the reported number of outbreaks of Diphtheria which Began, the number which Ended, and the number which were Present, in each Month of the Year 1896, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug	Sept	Oct.	Nov	Dec.	Year.
Outbreaks began ..	59	25	22	29	26	15	16	27	35	45	50	52	401
Outbreaks ended...	18	35	18	29	24	20	12	13	13	26	37	68	313
Outbreaks present.	73	74	59	65	58	45	39	53	72	100	119	131	-----

The last line of figures in Table 6, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. There may be a time during the outbreak when no cases are present, but if the subsequent cases can be attributed to infection from the preceding ones, it is called one outbreak. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 88 more beginnings than endings of outbreaks reported during the year 1896.

TABLE 7.—*Exhibiting the Number and Per Cent of Localities from which the presence of Diphtheria was reported, and the Number and Per Cent of Cases of Diphtheria present in Michigan in each Month during the Year 1896. (Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.
Localities. number.....	73	73	59	64	58	45	39	53	71	98	117	126
Per cent	22.1	22.1	17.8	19.3	17.5	13.6	11.8	16.0	21.5	29.6	35.3	38.1
Cases present, number....	324	239	181	184	177	129	109	244	390	738	936	881
Per cent	8.1	6.0	4.5	4.6	4.4	3.2	2.7	6.1	9.7	18.4	23.3	22.0

* The average population of the cities is 11,493, of the villages 828, and of the townships 973.

Source of Contagium of Diphtheria, and How the Disease is Spread.

Of the 4,013 cases of diphtheria reported, during the year 1896, as exhibited in the following table, the local health officers reported the source of contagium as follows:—Traced to a former case, 676; probably traced to a former case, 6; traced to cases of "sore throat," etc., 9; due to infection from "clothing," etc., 6; attributed to unsanitary conditions, 16; from outside jurisdiction, 43; probably from outside jurisdiction, 11; unknown, 2,156; not reported or indefinitely reported, 1,090; total, 4,013.

TABLE 8.—*Reported Source of Contagium of Cases of Diphtheria, in 1896.*

Traced to a former case	676
Probably traced to a former case	6
Traced to cases of "sore throat," "tonsillitis," and "membranous croup"	9
Due to infection from "clothing," "old rags," etc	6
Alleged unsanitary conditions	16
Contagium reported as from outside jurisdiction	43
Contagium reported as probably from outside jurisdiction	11
Unknown or reports not definite (includes those reported "Contagium," "Sporadic," "Spor- taneous," "De Novo," etc)	2,156
Not reported	1,090
All cases	4,013

Cases Traced to a Preceding Case

Table 8, shows that of the 4,013 reported cases of diphtheria, in the State in 1896, 676 were reported as traced to preceding cases of the disease.

Outbreaks Traced to Preceding Outbreaks.

The following table (9) and map, "Movement of Contagium of Diphtheria," show the sources and places to which diphtheria was spread in Michigan, where the contagium was reported by health officers to have been introduced into their jurisdictions from localities outside the State, or from other jurisdictions within the State.

TABLE 9.—*First, second and third localities, where the second locality was infected with Diphtheria from the first, and the third was infected from the second; and the numbers of cases and deaths from Diphtheria in the first, second and third localities, with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Allegan county: Allegan township..... (Nov.-Dec. 12.)	3	2	Allegan county: Monterey township.... (Nov.-Nov.)	1	0			
Barry county: Carlton township.....	*	---	Monroe county: London township..... (Apr. 3-Apr. 22)	6	0			
Bay county: Bay City..... (Aug. 22-Dec. 6.)	18	3	Bay county: Essexville village..... (Sept. 16-Nov. 14.)	2	0			
Benzie county: Lake township..... (Dec. 28, '95-Jan. 6, '96)	1	1	Leelanau county: Empire township..... (Jan. 8-Jan. 21)	1	0			
Berrien county: Benton Harbor city..... (Jan.-July.)	31	8	Berrien county: Benton township..... (June 7-Jan. 28, '97.) St. Joseph township..	22 3	5 3	Berrien county: Benton Harbor city.. (Dec. 1-Dec. 31.)	1	0
Branch county: Coldwater city..... Sept. 20-Dec. 21.)	16	3	Branch county: Bronson village..... Dec. 15-Jan. 21, '97.)	1	1			
Calhoun county: Marshall city.....	2	1	Calhoun county: Battle Creek city.....	33	5			
Cheboygan county: Cheboygan city..... (Jan. 25-June.)	8	0	Cheboygan county: Hebron township..... (Jan.-May 10.)	12	1			
Genesee county: Montrose township..... (Sept. 2-Dec.)	15	0	Genesee county: Flushing village..... (Dec. 12-Dec. 19)	2	0			
Genesee county: Vienna township..... (Oct. 11-Jan. 11, '97.)	20	3	Genesee county: Clio village..... (Dec. 4-Dec. 31)	5	0			
Grand Traverse county: Traverse City..... (Feb. 15-Dec. 12.)	23	4	Leelanau county: Centerville township.. (Aug. 12-Aug. 17.)	18	2			
Hillsdale county: Wright township..... (Oct. 10-Nov. 20.)	12	1	Hillsdale county: Pittsford township... (Nov. 10-Dec. 1.) Ransom township..... (Oct. 23-Oct. 31)	3 1	1 1			
Huron county: Fair Haven township... (Oct. 12-Oct. 18.)	6	2	Huron county: Winsor township..... (Nov. 25-Dec. 20)	6	0			
Huron county: Oliver township..... (July 23-)	15	1	Huron county: Bad Axe village..... (Sept. 13-Mar. 4, '97)	13	3			
Huron county: Paris township..... (Jan.-June.)	58	10	Huron county: Sigel township..... (Jan. 20-Feb. 6.)	2	1	Huron county: Bingham township... (Jan. 30-Feb. 15.)	1	0

* Diphtheria was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected: probably it was not reported to the health officer as the law requires.

TABLE 9.—CONTINUED.—*Movement of Infection.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Iosco county: Oscoda village.....	*	---	Sanilac county: Lexington village..... (May 26-June 2.)	1	1	Sanilac county: Lexington township. (June 4-June 30.)	2	0
Isabella county: Mt Pleasant city.....	*	---	Presque Isle county: Rogers City village..... (Jan. 15-Feb. 5.)	7	0			
Jackson county: Jackson city..... (Jan.-Dec. 28.)	64	25	Jackson county: Blackman township .. (Oct. 7-Dec. 1)	9	5			
Kalamazoo county: Kalamazoo city..... (Jan. 4, '96-Jan. 14, '97)	104	3	Barry county: Prairieville township. (Mar. 1-Mar. 18.)	4	1			
Kent county: Cannon township..... (Feb.-Feb. 29.)	8	0	Kent county: Ada township..... (Feb.-Feb. 23.)	3	1			
Lenawee county: Clinton village..... (Sept. 21-Sept. 29.)	2	1	Lenawee county: Tecumseh village..... (Oct. 3-Oct. 15)	1	0			
Macomb county: Mt. Clemens city..... (Sept. 22-Feb. 20, '97.)	27	5	{ Macomb county: Chesterfield township (Nov.-Nov. 24)	1	1			
			{ Clinton township..... (Oct. 24-Nov. 28.)	14	3			
Marquette county: Ishpeming city..... (Jan. 4-.)	114	14	Marquette county: Negaunee city..... (Sept. Feb. 8, '97.)	40	6			
Montcalm county.....	---	---	Isabella county: Coe township..... (July 6-July 25.)	2	0			
Muskegon county: Muskegon city..... (Apr. 23-Dec.)	128	12	Oceana county: Shelby village..... (Oct. 9-Oct. 18.)	6	1			
Osceola county: Hersey township..... (Nov. 1-Jan. 5, '97.)	12	1	Osceola county: Richmond township .. (Dec. 9-Dec. 28.)	3	0			
Oscoda county.....	---	---	Montmorency county: Albert township..... (June 4-Oct)	18	2			
Ottawa county: Holland city..... (Oct. 5-Dec.)	33	3	Ottawa county: Holland township..... (Dec. 29-Jan., '97.)	3	0			
Sanilac county: Croswell village..... (Sept. 29-Dec. 24.)	12	6	{ Sanilac county: Lexington township.. (Dec. 19-Jan. 20, '97.)	6	1			
			{ Worth township..... (Dec. 27-Jan. 16, '97.)	6	2			
Sanilac county.....	---	---	St Clair county: Emmet township..... (Apr.-Feb. 3, '97.)	56	10	{ St. Clair county: Brockway township. (Oct. 1-Nov. 7.)	6	0
						{ Emmet village..... (Nov. 18-Jan. 18, '97.)	4	0
Tuscola county: Fair Grove township ... (Mar.-May 25.)	6	2	Tuscola county: Akron township..... (Apr. 2-Apr. 16.)	5	1	{ Mussey township..... (Dec. 1-Jan. 4, '97.)	4	1
Van Buren county: Columbia township	1	0	Eaton county: Oneida township..... (Jan. 4-Jan. 24.)	3	2			

* This foot-note is printed at the bottom of the first page.

TABLE 9.—CONTINUED.—*Movement of Infection.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Wayne county: Detroit City..... (Jan. 2-Dec. 31.)	848	213	Monroe county: Raisinville township.. (Nov. 1-Dec. 10.)	4	2			
			Oakland county: Royal Oak township.. (Dec. 7-Jan. 30, 1897.)	9	3			
			St. Clair county: Clay township..... (Dec. 21-Dec. 29.)	6	2			
			Wayne county: Hamtramck township (Aug. 1-Sept. 14.)	3	0			
			Livonia township..... (Mar. 31-Apr. 16.)	4	1			
Wayne county: Springwells township .. (Apr. 22-Dec.)	114	33	Nankin township..... (Dec. 5-Feb. 15, 1897.)	7	2			
			Wayne county: Ecorse township..... (Aug-Jan., 1897.)	35	9			

Movement of Infection of Diphtheria into Michigan from outside the State.

Canada.....			Allegan county: Plainwell village..... (Dec. 21-Jan. 30, 1897.)	2	0			
			Shiawassee county: Owosso city..... (Aug. 11-May, 1897.)	43	5	Shiawassee county: Vernon township..... (Nov. 18-Nov. 27.)	1	0
			Allegan county: Casco township..... (Jan. 2-Feb.)	5	0			
Chicago.....			Ionia county: Ionia city..... (Nov. 21-Dec. 9.)	1	1			
			Jackson county: Hanover township.. (Apr. 23-Apr. 30.)	1	0			
Indiana: Mishawaka.....			Berrien county: Niles city..... (Sept. 15-Jan., 1897.)	26	2	Berrien county: Benton Harbor city.. (Dec. 28-Jan. 3, 1897.)	3	0
			Cass county: Penn township..... (Feb. 23-Apr. 3.)	5	0	Buchanan village..... (Oct. 17-Oct. 27.)	1	0
Indiana: New Carlisle.....			Berrien county: Galien village..... (Nov. 29-Dec. 9.)	4	1	St. Joseph township.	1	1
Indiana.....			Berrien county: Buchanan township.. (Oct. 12-Oct. 23.)	5	0			
Missouri: St. Louis.....			Berrien county: Buchanan township.. (Dec. 22-Jan. 8, 1897.)	1	0			
Montana.....			Houghton county: Osceola township..... (Nov. 20-Dec. 31.)	4	0			
Ohio: Toledo.....			Monroe county: Ida township..... (Dec. 15-Jan. 6, 1897.)	3	0			

TABLE 9.—CONTINUED.—*Probable Movement of Infection.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Berrien county: St. Joseph township..... (Jan.-Feb. 18.)	5	0	Berrien county: Benton township. (Jan. 6-Feb.)	2	0			
Berrien county.....	—	—	Cass county: Porter township (Feb. 27-Mar. 20.)	2	1			
Gratiot county: Ithaca village.....	*	—	Shiawassee county: Owosso city (Jan. 29-Apr. 29.)	3	0			
Hillsdale county.....	—	—	{ Lenawee county: Blissfield village (Feb. 2-Feb. 15.)	1	0			
Houghton county: Calumet township..... (Jan.-Dec. 30.)	114	8	{ Rome township (Dec. 26-Jan. 2, 1897.)	1	0			
Houghton county: Houghton village..... (Oct. 21-Jan. 17, 1897)	16	3	Houghton county: Red Jacket village..... (Oct.-Dec. 2.)	10	0			
Huron county: Bad Axe village..... (Sept. 13-Mar. 4, 1897)	13	3	Houghton county: Hancock village (Nov.-Dec.)	2	2			
Huron county: Paris township..... (Jan.-June.)	58	10	Sanilac county: Croswell village (Sept. 29-Dec. 24.)	12	6			
Jackson county: Jackson city..... (Jan.-Dec. 28.)	64	28	Huron county: Colfax township..... (Jan. 14-Feb. 5.)	6	4			
Kalamazoo county: Kalamazoo city..... (Jan. 4-Jan. 4, 1897.)	104	3	Jackson county: Grass Lake village..... (Nov. 20-Dec.)	4	1			
Kent county: Grand Rapids city..... (Jan.-Dec.)	82	20	Kalamazoo county: Climax township..... (Jan. 20-Feb. 6.)	3	1			
Lenawee county: Hudson city..... (Dec. 29-Jan. 15, 1897.)	2	0	{ Kent county: Cannon township..... (Feb. 8-Feb. 29.)	8	0			
Manistee county: Manistee city..... (Jan. 13-Dec. 4.)	21	7	{ Kent county: Sparta township..... (Dec. 12 Jan. 1, 1897.)	1	0			
St. Clair county: Emmet township..... (Apr.-Feb. 3, 1897.)	56	10	Hillsdale county: Ransom township.....	3	0			
Van Buren county.....	—	—	Manistee county: Onkama township... (Apr. 1-May 10.)	16	5			
Wayne county: Detroit city.....	848	213	St. Clair county: Riley township..... (Dec. 14-Dec. 24)	1	0			
			Allegan county: Casco township..... (Sept. 4-Oct. 1.)	3	0			
			{ Kalamazoo county: Pavilion township... (July 30-Aug. 20)	1	0			
			{ Oakland county: Pontiac city..... (Sept. 11-Dec. 14.)	6	1			

TABLE 9.—CONCLUDED.—**Probable Movement of Infection into Michigan from Outside the State.**

First Localities from which Diphtheria was spread			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Canada			Oakland county: Waterford township.. (Jan. 3-Jan. 18.)	5	0			
Chicago			Kalkaska county: Kalkaska village	3	0			
			(Feb. 8-Feb. 21.)					
New York			Berrien county: New Buffalo township (Jan. 5-Jan. 20.)	5	1			
			Kalkaska county: Rapid River township (Oct. 21-Nov. 19.)	4	2			
Ohio: Toledo			Hillsdale county: Wright township	12	1			
			(Oct. 10-Nov. 20.)					

On the accompanying map, the spread of diphtheria in Michigan, in the year 1896, as reported to this Office, is shown by black lines which connect the localities; the arrow-heads indicate in each instance the direction of the movement.

Membranous croup. Non-specific? Diphtheria in same locality later.

Sept. 8, 1896, Secretary Baker wrote to J. C. Flynn, M. D., health officer of Warren Vil., Macomb Co., as follows:—

"Referring to your postal card report for the week ending September 5, you report one case of membranous croup, and on the margin of the card you say 'The case of membranous laryngitis was non-specific.'

"Will you kindly inform me why you think it was non-specific?

"Herewith I enclose a copy of resolutions adopted by this Board relative to membranous croup.

"I have been under the impression that even where the membrane is due to an irritant chemical substance, yet there is *some* specific micro-organism present, although not necessarily the *Lœffler bacillus*. Is not that your view?"

In replying Sept. 14, 1896, Dr. Flynn said:—

"When I said the membranous croup was non-specific, I meant it was not diphtheria or laryngeal diphtheria. My view of membranous croup coincides with your views of the cause.

"In my opinion croup is not contagious as we find diphtheria is. In all my years practice, and having had a number of cases of membranous croup, I never saw a second child in any family afflicted at the same time nor can I recall a case where I ever had two in a family with that disease."

In this jurisdiction there was an outbreak of diphtheria, resulting in 9 cases with 1 death, and it lasted from Oct. 1 to Nov. 22, 1896.

MOVEMENTS OF CONTAGIUM OF DIPHTHERIA IN 1896.



THIS MAP ILLUSTRATES TABLE 8. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS.

— DEFINITELY TRACED. - - - PROBABLY TRACED.

[PLATE 914]

Supposed infection with diphtheria in utero.

May 18, 1896, H. A. Powers, M. D., health officer of Assyria Tp., Barry Co., wrote to the Secretary of this Board as follows:—

"The case of diphtheria reported by the clerk was an infant 6 days old. It is my opinion that the child contracted diphtheria in utero, as its mother had the disease during the first months of her gestation. The child was born a strong healthy boy and for 4 days was apparently perfectly healthy; on the 5th day it was taken sick and died next day. The family had moved from the house where they lived when the mother had it. No clothing except new and good was used around the child. There have been no further cases. Please let me know what you think of my theory."

In reply, the Secretary of this Board wrote, May 21, 1896, to Dr. Powers as follows:—

“Your letter of May 18 relative to diphtheria is before me, for which please accept thanks.

“The subject is a very interesting one to me, and while it is possible that the infant may have contracted the disease as you suggest, yet I think that it is probable that the disease was contracted from some article that was not thoroughly disinfected at the time the mother had the disease. Four days was time enough for period of incubation.

“Herewith I enclose a blank for a final report and a stamped envelope for its return.”

On the final report, Dr. Powers stated that, after the death of the child, five pounds of sulphur per thousand cubic feet of air space was used, and that all clothing, bedding, etc., worn or used by nurses and others exposed to infection were disinfected by boiling and fumigation.

Cistern water as an alleged cause of diphtheria, in Frederic Tp., Crawford Co.

May 25, 1896, E. H. Dean, health officer of Frederic Tp., Crawford Co., wrote to the Secretary of this Board stating that one family, in which diphtheria was prevalent, were using cistern water for drinking and cooking purposes, and had been doing so for 9 or 10 years. Mr. Dean thought that it might be a cause of the disease, and asked the opinion of the Secretary on this point.

Secretary Baker replied, May 26, as follows:—

“Until quite recently the supposition has prevailed that cases of diphtheria might be caused by filthy conditions of premises, but later researches have made it plain that this notion is not a correct one. While it is true that the water might be contaminated by the diphtheria germ, yet it is not probable that the water was the cause of the disease, but it is more than probable that they contracted the disease from some infected person or thing, where diphtheria had been present some time and where thorough disinfection was not enforced. I herewith enclose a marked pamphlet bearing upon that subject. Relative to the drinking of the cistern water where it remains in the cistern for months, it should not be used for drinking or cooking purposes unless it is first thoroughly filtered or boiled.”

Diphtheria following Tonsillitis in Pickford Tp.

The following extracts from correspondence between D. H. Webster, M. D., health officer of Pickford township, Chippewa county, and the Secretary of this Board, relate to the supposed development of diphtheria from tonsillitis; and to the use of antitoxine in the treatment of diphtheria.

Jan. 7, 1896, D. H. Webster, M. D., health officer of the township, by letter, informed the Secretary of an outbreak of diphtheria of “spontaneous” origin in Pickford Tp. Dr. Webster said there were 12 cases and he asked the opinion of the Secretary relative to the use of antitoxine at different ages.

Jan. 10, 1896, Secretary Baker replied in part as follows:—

“Relative to the use of antitoxine, I am not in a position to advise in regard to that, as the work of the Board is for the prevention and restriction of the dangerous diseases, by isolation and disinfection, and not as to the treatment. However I believe that it is being used in some of the larger cities with good results.”

A number of publications of this Board relative to the prevention and restriction of diphtheria, and a "blue letter", advising him to make reports to this office, were forwarded to Dr. Webster.

Mar. 21, 1896, Dr. Webster reported a second outbreak of diphtheria in his township, and with his final report relative thereto he wrote a letter, dated Apr. 11, 1896, to the Secretary of this Board, which is as follows:—

"I beg leave to forward you final report of outbreak of diphtheria in Township Pickford, Chippewa Co. In reference to its origin, I will say that I can only trace it to a case of tonsillitis in a boy 15 years of age in a family of six or seven children. A boy younger complained of sore throat a few days after, but was not treated, as he recovered in a few days and the mother said he had taken cold a day or two previous; none of the other children were taken with it. About a week after, the first boy, the one with tonsillitis, took a child of a neighbor's on his knee, and in a short time this family of five children were taken with diphtheria, with one death. Now what I want to know is this: can diphtheria develop from tonsillitis? This was a typical case of the above; and besides we have not had a single case of diphtheria in this locality for two years. Last year we were entirely free from it. It is difficult for me to send on blank a report in detail as isolation cannot be practised, as the dwellings are so small that it is impossible; and as for privies there are but few. Am I right in saying that to me, and from my experience in the Upper Peninsula, nearly all forms of sore throat are contagious? Wishing to hear from you on this point, you will oblige."

Apr. 16, Secretary Baker replied in part as follows:—

"Relative to diphtheria developing from tonsillitis, the case which was thought to be tonsillitis was probably a case of diphtheria, perhaps in a very mild form and not recognized. Many times mild cases of diphtheria are not recognized unless there is a bacteriological examination, and I do not understand that you had one in the case referred to in your letter.

"Relative to nearly all forms of sore throat being contagious, I fully agree with you, and this Board has passed resolutions upon that subject, a copy of which I herewith enclose."

Another outbreak in Pickford Tp. during the current year (from Oct. 25 to Nov. 21) which resulted in 8 cases with 2 deaths was duly reported, but apparently not connected with the former one.

Diphtheria following Tonsillitis in Ovid Vil., Clinton Co.

Dec. 1, 1896, J. Benson Hill, M. D., health officer of the village, wrote to the Secretary of this Board as follows:—

"I have a number of cases of tonsillitis; one as I wrote you developed into diphtheria. My opinion is that cases of simple tonsillitis during an epidemic of diphtheria or scarlet fever will sometimes develop into diphtheria. Am I correct or in error? Should all cases of tonsillitis with canker on the tonsils be reported and the houses placarded with sign of diphtheria? Will membranous croup develop from tonsillitis? Can you send me the exact difference between the three diseases, as there is a dispute on this point."

Dec. 2, 1896, Secretary Baker replied as follows:—

"Your letter of December 1 relative to diphtheria is before me for which please accept thanks.

"Relative to your questions regarding tonsillitis and membranous croup, I herewith enclose copy of resolutions adopted by this Board which will, I think, fully explain to you the position this Board takes upon these diseases.

"As stated in the resolutions, in all cases of sore throat, precautions should be taken, and in localities where diphtheria exists should be regarded as suspected cases of diphtheria.

"The pamphlet issued by this Board upon the restriction and prevention of diphtheria also states the position this Board takes upon that subject, and I herewith enclose a marked copy."

In this outbreak one fatal case was reported.

Diphtheria and Scarlet Fever in Niles City, Berrien Co.

Sept. 21, 1896, a letter was sent from the Office of the State Board of Health to the health officer of Niles, asking for prompt reports relative to diphtheria which it was alleged in the Detroit Evening News, Sept. 19, was then existing in Niles. No response having been received from the health officer of Niles, and it having been alleged by a citizen of Niles that more than one physician had declared diphtheria to be present in Niles and yet the health officer was not doing anything to restrict it, on consultation with the Governor it was decided to send a physician from the Office of the State Board of Health to investigate. The Office having no bacteriological laboratory, the health officer of Kalamazoo was telephoned to requesting him to hand to the State Board's inspector as the train passed through Kalamazoo three culture tubes and sterilized swab, for testing relative to diphtheria.

A report of the investigation is as follows:

"Report of the Investigation of an Alleged Outbreak of Diphtheria in the City of Niles, Michigan.

"I left Lansing, Friday morning, Sept. 25, 1896. In Kalamazoo, Dr. Rockwell met me at the train and gave me three serum tubes for diphtheria cultures. I arrived in Niles at three o'clock in the afternoon, called at once at the office of Dr. W. T. Dougan, health officer of the city, but not finding him in I went to the office of Dr. Greenamyer.

"Dr. Greenamyer took me to see his patients; they presented symptoms and case-histories about as follows:

"1st Case.—Little German girl, 2½ years old, had been sick 3 days; had scarlatinal rash over the whole body; glands of the neck swollen and tonsils enlarged, but there was no membrane in the throat. Had fever and was very fretful.

"2d and 3d Cases.—Boy, 3 years old—Girl, 2 years old (German family); both children had a rash, with fever and sore throat, about two weeks ago; they have some desquamation in the palms of the hands now; the cervical glands are swollen and the tonsils enlarged.

"An older brother of these two children was sick at the same time they were. He had no rash, so his mother says, but his throat was very much swollen; he was sick only two days and then died suddenly when attempting to talk to his mother. A doctor had seen the case a few hours before death and told the parents he was getting better.

"A public funeral was held in this case, and was largely attended by the Germans of the city. This occurred about two weeks ago.

"4th and 5th Cases.—Boy 6 years old; Girl 3 years old. Dr. Greenamyer says the boy had no rash; the back part of his throat was covered with a white membrane; he had fever and was quite sick. He has been about the house for several days now, but his tonsils are still much swollen (no membrane), and the cervical glands enlarged. He has the cachectic appearance of a person recovering from diphtheria.

"His sister had sore throat and fever, but no rash; tonsils and glands of the neck are now enlarged. Other children (several) did not have the disease.

"6th and 7th Cases.—Boy and Girl (German). Had a rash, scarlet fever, Dr. Greenamyer thinks, some 8 days ago. They have some desquamation of the palms of the hands, the tonsils and glands of the neck are enlarged in both cases.

"8th Case. Rubie Hilman, aged 7 years. Was taken sick on Sunday, Sept. 20, with sore throat, fever and loss of appetite. Dr. Dougan called a few days later, found some membrane on the tonsils; for the past three days the larynx has been involved and to-day (Sept. 25) she is having great difficulty in breathing. There has been no rash; temp. from 99°-101.5°.

"I saw some membrane on the tonsil and inoculated a tube with it. (Saturday evening.—The result will be telegraphed to Dr. Baker as soon as the culture is examined.)

"9th and 10th Cases.—Boy and Girl (German). Boy is in bed with sore throat, fever, headache, etc. No membrane, no rash. Tonsils and cervical glands enlarged. The girl has enlarged tonsils and glands but is able to be about the house.

"In the evening I found Dr. Dougan at his office; he took me to see

11th and 12th Cases.—Mrs. L. G. Hart and daughter. Mrs. Hart was in South Bend, Ind., two weeks ago, attending the Fair, she came home and was taken sick about ten days ago with sore throat, which showed membrane for several days. There is but little swelling in her throat now.

"The daughter was taken sick a few days later, with same symptoms. Throat showed membrane, no rash, had some fever. The tonsils and glands of the neck are still enlarged. They are to remain in the house for a week yet, although they burned sulphur in the house to-day and the child expected to go back to school soon.

SUMMARY.

"I believe they have had both diphtheria and scarlet fever in Niles. The cases are and have been mostly among the poorer German families. The fatal case I believe from the history to have been diphtheria. The public funeral held in this case probably spread the infection.

"The greater number of cases are in the German settlement on the west side of the river. The case of scarlet fever is on the east side of the city—a mile from the other cases.—It is the only well marked case of scarlet fever that I saw, the other cases have more the appearance and histories of diphtheria.

"Case No. 8 (Hilman) I believe to have been laryngeal diphtheria. (Tubes left with Dr. Crane.)

"There has been neglect in reporting the cases to the health officer by physicians and householders. There has been neglect on the part of the health officer in not placarding the houses and ordering the persons exposed to remain at home. I am told a number of children from these infected families have been sent home from school.

"Dr. Greenamyer has most of the cases under his care now, probably because he speaks German. He is a conscientious man, and I think a letter to him, with a number of documents in German, on the restriction of diphtheria and scarlet fever would accomplish much good.

"I urged the health officer to placard all infected houses and order the families to remain at home until after the recovery of the patients and the fumigation of the premises. I advised him to notify the physicians of the city that they must report cases of communicable diseases to him promptly. These things he has promised to do.

"Saturday morning I called on Mr. Woodcock who is a member of the school board of the city, he is anxious to have proper measures taken to restrict the disease. I told him of the neglect on the part of the physicians in reporting the disease, and of the neglect, on the part the authorities, to placard premises and to isolate infected persons. Mr. Woodcock took me to see the mayor of the city, I told him of the condition of cases in the city, of the danger attending such neglect, and gave him State Board of Health documents stating the law on the subject. He called in the city marshal and ordered him to placard the houses, under the direction of the health officer.

"Mr. Woodcock promised to have a meeting of the school board called, at which immediate action would be taken to prevent children, who are likely to convey infection, from attending school.

"Dr. Dougan left for the country early Saturday morning, so I did not see him again.

"Arrived in Kalamazoo Saturday noon (Sept. 26). Called at once on Dr. Crane, bacteriologist for the local board of health, who made an examination of the material on the swab which I had used in Niles. This specimen showed diplococci which the Doctor said were usually found in this form on the swab but on culture would develop as streptococci diphtheria as found in mixed infection. He also found bacilli, which were not the characteristic Klebs-Loeffler bacillus; but he said it was a *suspicious* case.

"The tube was placed in the incubator and another tube inoculated from the swab. These tubes will be left in the incubator for 8 hours, then examined and the result will be telegraphed to Mr. F. W. Richter, Mayor of Niles, and to the Secretary of the State Board of Health.

"Geo. H. Cattermole, M. D."

A telegram from Dr. Crane says: "Diphtheria bacilli found in the Niles Case." The clinical diagnosis of diphtheria was, therefore, bacteriologically confirmed.

Sept. 28, 1896, the Secretary of this Board wrote to Dr. Dougan as follows:—

"I am informed by Dr. Geo. H. Cattermole, a representative of this office, that both diphtheria and scarlet fever are present in Niles. Herewith I enclose a circular letter relative to scarlet fever, and by mail I send to you a few pamphlets bearing upon the restriction and prevention of that disease, which I trust you will distribute where they will do the most good,—neighbors of those sick.

"Relative to the diphtheria, Dr. Cattermole's report is verified by a bacteriological examination which shows the Löffler bacillus.

"I wrote to you relative to diphtheria on September 21, requesting you to report to this office, but up to this date no report has been received from you. Act 137, Laws of 1883, says that whenever the health officer has received reliable notice or otherwise has good reason to believe that there is within his jurisdiction any dangerous communicable disease to 'immediately investigate the subject'. 'To give public notice of infected places by placard on the premises, and otherwise if necessary,' and 'to keep the Secretary of the State Board of Health constantly informed respecting every outbreak of a disease dangerous to the public health.'

"Section 1673 of Howell's Statutes also requires the board of health whenever any disease dangerous to the public health is found to exist in his jurisdiction, to use all possible care to prevent the spreading of the infection, and to give public notice of infected places to travelers, by such means as in their judgment shall be most effectual for the common safety. Act 15, Laws of 1891, provides a penalty in case any person wilfully or knowingly exposes, aids in exposing or causes to be exposed any other persons to diphtheria or scarlet fever. I herewith enclose marked leaflets and pamphlets bearing upon the above subjects.

"I trust that you and your board will do all in your power to prevent the spreading of the infection of both diphtheria and scarlet fever, or any other dangerous disease that may appear in your jurisdiction, and that you as health officer of the city, will keep this office constantly informed respecting every outbreak, by making special weekly reports on blanks 'M' with which you are supplied from this office."

Sept. 29, 1896, Dr. Dougan wrote to the Secretary of this Board relative to this subject. Subsequently he also wrote informing this office as to the condition of sickness in Niles. It appeared that to enforce restrictive measures was practically an impossibility owing to the mild nature of the cases and the failure of the physicians to report cases of sickness to the health officer.

Relative to physicians reporting, the Secretary of this Board, in a letter dated Oct. 1, 1896, to Dr. Dougan, said:—

"The law requires all cases of dangerous communicable diseases to be reported directly to the health officer, if this law is being violated you should report all such violations to the prosecuting attorney, whose duty it is to prosecute for all such violations."

In a letter to the Secretary of this Board, dated Oct. 4, 1896, Dr. Dougan said:—

"I * * * * have notified prosecuting attorney of failure of physicians to report the case. I am trying all I can to control the epidemic but the cases are so mild that I fear there are some who never go to a physician with their case and unintentionally spread the disease. We have one physician (the one I reported to Prosecuting Attorney) who claims there is no scarlet fever or diphtheria in our place. He gave the child a certificate of good health, who was scaling off. He has also gone to diphtheria cases, attended by other physicians and assured them there was no contagium about them. I am fearful that this will make us trouble as many friends, dreading to have their houses placarded, employ him and we fail to know of the case. The Prosecuting Attorney will be here Wednesday and I hope by that time we can stop the trouble."

In reply, the Secretary of this Board wrote, Oct. 5, 1896, to Dr. Dougan in part as follows:—

"Relative to the physician who goes where the other physicians have cases and then tells the people there is no such disease, he should certainly be prosecuted, and I am very glad to know that you have reported the case to the prosecuting attorney, and I trust that the prosecuting attorney will stand by you and bring this man to time."

Oct. 10, 1896, Dr. Dougan wrote in part as follows:—

"Diphtheria now seems to be affecting the nasal passages. Some of our physicians deny that we have either diphtheria or scarlet fever, and I fear they have cases not reported."

"I heard today from our prosecuting attorney and have done all I could to push the case against the physician I wrote you of for not reporting, but the way the matter drags, I am fearful of the result.
* * * I feel if we cannot enforce the law we will have trouble here later."

Later in a letter dated Oct. 24, 1896, to the Secretary of this Board, Dr. Dougan said in part as follows:—

"I am convinced that there are cases not reported and since our prosecuting attorney decided he could not convict any one for not reporting cases unless I could show that some one had taken the disease (and died) from the non-reported case we are having more difficulty in keeping up even an appearance of quarantine. I had hoped to have reported our city clear of both diseases but cannot this week."

In this outbreak, which lasted from Sept. 15, 1896, to Jan. 1897, 26 cases with 2 deaths resulted. Considering the difficulties with which the local health authorities had to battle, their work is to be commended.

Diphtheria in Lenawee county.

Diphtheria was present in Lenawee county during a greater part of the year. In the 31 health jurisdictions (2 cities, 7 villages, and 22 townships) in this county, 11 jurisdictions (2 cities, 4 villages, and 5 townships) were infected. In the 11 infected health jurisdictions, 15 outbreaks occurred; a total of 33 cases, 10 of which were fatal. Precautionary measures were enforced as follows:

Precautionary measures.	Localities.	Outbreaks.	Cases.	Deaths.
Isolation or disinfection or both not mentioned or statements doubtful	6	9	23	8
Disinfection enforced, isolation doubtful	0	0	0	0
Isolation enforced, disinfection doubtful	1	1	1	0
Disinfection enforced, isolation neglected	1	1	2	1
Isolation enforced, disinfection neglected	0	0	0	0
Isolation and disinfection, both neglected	0	0	0	0
Isolation and disinfection, both enforced	3	4	6	0

The correspondence of J. L. Tuttle, M. D., health officer of Clinton Village, Lenawee Co., with the Secretary of this Board illustrates a difficulty commonly met with in the enforcement of restrictive measures.

Sept. 29, a communication was received at this Office alleging negligence on the part of the health officer of Clinton village in permitting a lady, who had nursed her daughter during her illness and death from diphtheria, to return immediately thereafter to her home in Tecumseh.

Sept. 29, Secretary Baker wrote to Dr. Tuttle as follows:—

"On September 26 I wrote to you relative to an outbreak of diphtheria in your jurisdiction.

"Information reaches this office this morning that a Mrs. Charles Gray of Tecumseh, was at the home of her daughter, Mrs. Judd, who died of diphtheria in your village, caring for her, and that, after the funeral, she was allowed at once to go back to her home in Tecumseh, and before the danger of her communicating the disease had passed. Mrs. Gray now has diphtheria. You should certainly not have allowed Mrs. Gray to leave the Judd house until all danger of her having or communicating the disease

had passed. Act 137, Laws of 1883, provides that the health officer shall isolate all sick and infected persons so long as there is danger of their communicating the disease.

"It is alleged that no quarantine is being maintained at Clinton and that exposed people are allowed to go at large, and are a menace to the entire surrounding community. Act 15, Laws of 1891, provides a penalty in case any person wilfully or knowingly exposes, aids in exposing or causes to be exposed any other person to certain dangerous communicable diseases, among which is diphtheria. I trust that you and your board of health will do all in your power to prevent the disease from spreading in your own jurisdiction and also from spreading into other jurisdictions."

Sept. 29, Dr. Tuttle replied stating that the report to him contained little truth and much untruth. Oct. 3, 1896, Dr. Tuttle again wrote as follows:—

"In your letter of 29th Sept., you say I did wrong in permitting Mrs. Gray to return to Tecumseh. Kindly consider the following circumstances and advise me what I should have done. I commenced disinfecting the house while the body was being buried. No person could live in any part of the house except possibly down cellar, while this was going on. Mrs. Gray was instructed to put on an entire suit of uninfected clothing and to leave her infected clothes in the room to be disinfected with the rest. Now the question arises, should I have kept Mrs. G. in the house and deferred disinfecting for ten or more days subjecting her to a constant exposure, or what disposition should I have made of her other than I did? Mr. G. did *not* appear on the street in clothes worn in the sick room and in no case except when absolutely necessary. Was it wrong for him to go for an undertaker (in clean clothes), was it wrong for him to see the sexton and secure a place in which to bury his young wife?

"Kindly consider these circumstances and decide them as you would have done had you been in my place and oblige.

"There was no person allowed in the house, and *there was no person in the house* excepting the husband, mother, and myself from the first till the undertaker took charge."

Oct. 5, 1896, Secretary Baker replied as follows:—

"Your letter of October 3 relative to diphtheria is before me, for which please accept thanks. I think you did right as far as you went; but you should have gone a step farther and have seen that your board of health provided temporary shelter for those who were exposed, while disinfection of the premises was being done, and by so doing you could have kept under your surveillance the persons exposed, until the danger of their having the disease was over. Isolation or at least surveillance of persons exposed should continue until after the expiration of the period of incubation.

"Relative to the husband of the woman who died, the nose and the throat are the places most likely to be infected after exposure to diphtheria; therefore 'clean clothes' would *not* be a sufficient safeguard. He should have been isolated until his nose and throat were free from the specific cause of diphtheria."

ESTIMATED NUMBER OF OUTBREAKS AND CASES OF DIPHTHERIA PREVENTED AND LIVES SAVED BY ISOLATION AND DISINFECTION.

Tables 10 and 11 and the following diagram compare the average numbers of cases and deaths in outbreaks of diphtheria where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 11 it

* In the compilation of the reports for Tables 10 and 11 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

may be seen that during the ten years, 1887-96, there were over six times as many cases and nearly six times as many deaths per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 10 it may be seen that during the year 1896 there were reported to the Office of the State Board of Health 405* outbreaks of diphtheria, with 2,460 cases and 432 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 5,026 cases and 899 deaths, and taking from these respectively the cases (2,460) and deaths (432) which did occur, leaves 2,566 cases and 467 deaths indicated as prevented in these 405 outbreaks, by isolation and disinfection. By the same method of computation for each year the indicated saving during the ten years, 1887-96, is 31,284 cases and 6,431 lives.

From Table 10, it may be observed that in the 69 outbreaks in which isolation and disinfection were enforced, there were averages of 2.38 cases and 0.39 deaths per outbreak. These 69 outbreaks existed in 95 households; 56 of the 69 outbreaks existed in single households attended by 103 cases and 15 fatalities; the 13 remaining outbreaks existed in the remaining 39 households attended by 61 cases and 12 fatalities. During the year 16 outbreaks recurred in the localities where restrictive measures had been enforced, in 2 of the 16 outbreaks restrictive measures were again enforced and in the rest they were neglected. The source of contagium in the 16 outbreaks may be stated as follows: 5 were traced to foreign infection, 9 were unknown, and 2 were indefinite.

* *Definition of Outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the later cases are considered as part of the same outbreak. Possibly the sixty-day limit may at some future time be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of *years* require that outbreaks be counted as "closed," at the end of the *year*; while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

TABLE 10.—*Exhibiting for the ten years, and for each of the ten years 1887-96, the numbers of Reported Outbreaks, Cases and Deaths; also for this ten-year Period, the average number of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection was Doubtful; in which both Isolation and Disinfection were Neglected; in which both Isolation and Disinfection were Enforced; and also the Numbers of Cases and Deaths Indicated to have been prevented by Isolation and Disinfection.*

Years.	All Outbreaks.*			Isolation and Disinfection, or both, not Mentioned, or Statements Doubtful.			Isolation and Disinfection both Neglected.			Isolation and Disinfection both Enforced.			Indicated Saving of Cases and Lives by Isolation and Disinfection.	
	Outbreaks	Cases.	Deaths	Outbreaks	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Cases.	Deaths
1887.....	398	2,324	561	202	732	190	60	822	195	78	198	51	† 3,132	† 733
1888.....	311	1,529	324	199	840	189	34	527	81	58	101	31	3,292	446
1889.....	376	1,986	418	254	1,314	280	41	478	108	63	98	14	2,398	570
1890.....	439	2,743	619	291	1,649	401	71	902	169	46	70	15	2,862	426
1891.....	532	2,965	643	386	1,777	389	79	944	194	70	157	33	3,392	668
1892.....	525	3,485	740	323	2,341	456	52	657	147	49	105	24	3,146	746
1893.....	536	3,133	746	303	1,684	362	74	1,020	282	65	139	45	4,253	1,296
1894.....	420	2,262	401	202	986	174	56	738	122	81	176	37	3,274	512
1895.....	388	2,292	425	178	1,102	209	45	610	119	70	146	28	2,969	599
1896.....	405	2,460	432	153	925	165	64	794	142	69	161	27	2,566	467
Totals for the 10 years, 1887-96.....	4,330	25,146	5,342	2,471	13,317	2,815	576	7,492	1,559	619	1,374	305	{ 431,284 431,187	{ 6,431 6,422
Average for the 10 years, 1887-96.....	433	2,515	534	247	1,332	282	58	749	156	65	137	31	3,128	613
Average cases and deaths per outbreak for the 10 years, 1887-96.....	-----	5.81	1.23	-----	5.39	1.14	-----	13.01	2.71	-----	2.12	.47	-----	-----

* These do not include the cases and deaths in a number of the larger cities (foot-note to Table 11), because of the difficulty in determining the beginning and ending of an outbreak in those cities, in which the disease was present in some part of the city nearly all the year. † The numbers of cases and deaths in this double column are found by multiplying "All Outbreaks" for each year by the average number of cases, or deaths per outbreak in those outbreaks in which Isolation and Disinfection both were neglected, for that year, and deducting from the result thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year. ‡ The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows: (1) the 31,284 cases and 6,431 deaths are totals of the columns representing cases and deaths saved as explained in the foot-note, (2) the 31,187 cases and 6,422 deaths are obtained by multiplying the average numbers of cases and deaths per outbreak for the ten years, 1887-96 (13.01 and 2.71 where isolation and disinfection were neglected), by the total number of outbreaks to find the numbers which would have occurred if all outbreaks had been neglected and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the ten-year period.

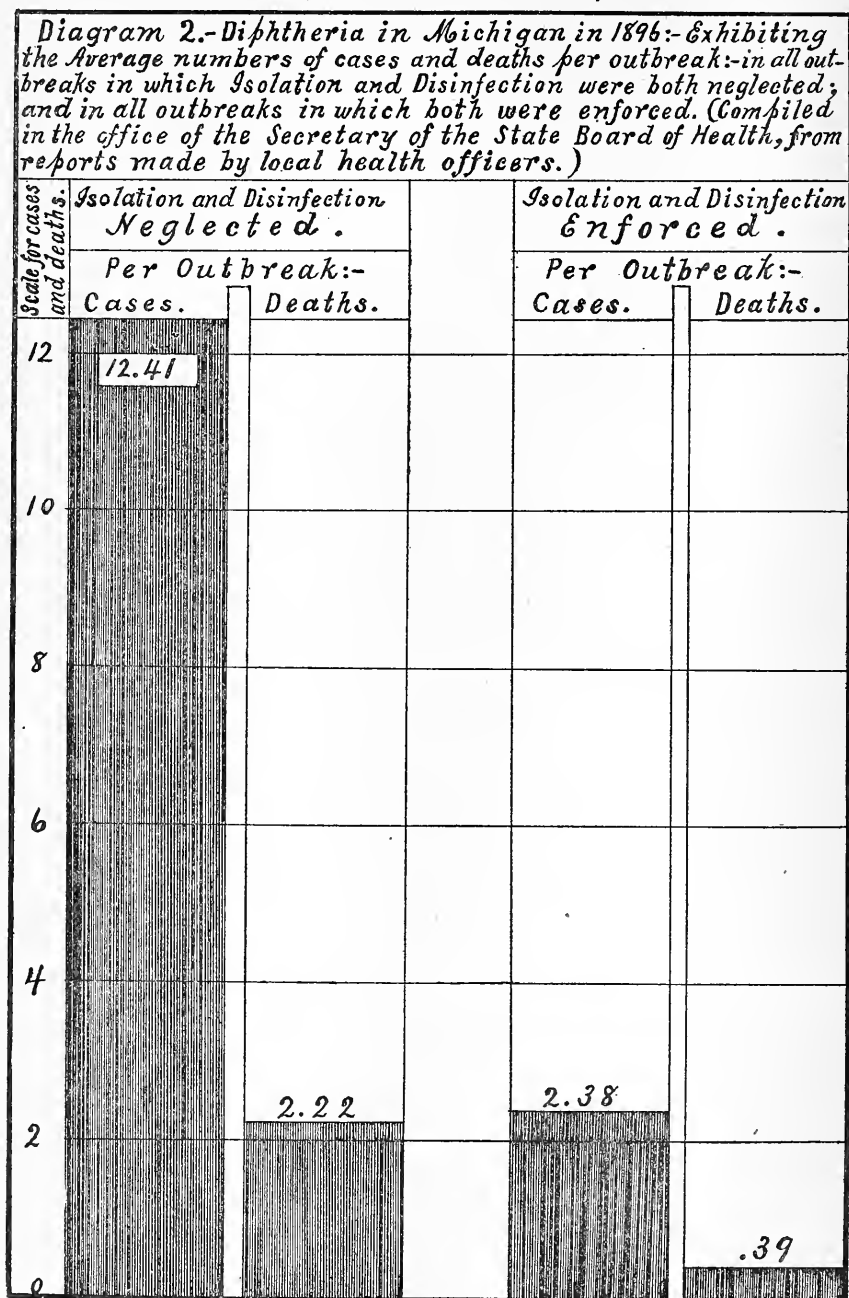
Isolation and Disinfection Restricted Diphtheria in 1896.

TABLE 11.—*Diphtheria in Michigan in 1896: Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 405 outbreaks reported; (2) in the 153 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 12 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 41 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 41 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 25 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 64 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 69 outbreaks in which Isolation and Disinfection were both enforced.*

	(1) All outbreaks. (405 outbreaks.)*		(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (153 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (12 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (41 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (41 outbreaks.)		(6) Isolation enforced—Disinfection neglected. (25 outbreaks.)		(7) Isolation and Disinfection both neglected. (64 outbreaks.)		(8) Isolation and Disinfection both enforced. (69 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals...	2,460	432	925	165	45	14	161	29	251	57	80	7	794	142	164	27
Averages.	6.07	1.07	6.05	1.08	3.75	1.17	3.93	.49	7.10	1.39	3.20	.28	†12.41	†2.22	†2.38	†.39

* These do not include the cases and deaths in Detroit, Grand Rapids, Saginaw, W. S., Kalamazoo, Muskegon, Ishpeming and Springwells township, Wayne county, because of the difficulty in determining the beginning and ending of an outbreak in these localities, in which the disease was present in some part of the locality nearly all the year.

† These figures are graphically represented in the diagram opposite this page.

TABLE 12.—*Exhibiting the reported Period of Incubation, stated in days, in 128 cases of Diphtheria. Compiled from reports of Health Officers in Michigan, for the year, 1896.*

Incubation period— Days.....	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	18	20	22	30
Cases in each period.....	3	*11	+6	†12	\$9	†13	‡21	8	7	**18	††5	2	‡‡2	3	1	1	§§2	2	¶¶2

* In 1 of these cases it was reported as *about* 2 days.
† In 2 of these cases it was reported as *about* 3 days.
+ In 2 of these cases it was reported as *about* 4 days.
\$ In 2 of these cases it was reported as *about* 5 days.
† In 2 of these cases it was reported as *about* 6 days.
‡ In 10 of these cases it was reported as *about* 7 days.
** In 6 of these cases it was reported as *about* 10 days.
†† In 2 of these cases it was reported as *about* 12 days.
‡‡ In 1 of these cases it was reported as *about* 14 days.
§§ In 1 of these cases it was reported as *about* 20 days.
¶¶ In 1 of these cases it was reported as *about* 30 days.

The average period of incubation of diphtheria in the 128 cases is 7.9 days.

TABLE 13.—*Exhibiting, relative to Diphtheria in Eighty-eight Instances in Michigan in 1896, the Reported Period of Incubation, within certain Limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

In eighteen instances.		In eighteen instances.		In eighteen instances.		In eighteen instances.		In sixteen instances.	
Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.
1 to 2	1.5	2 to 10	6.0	3 to 14	8.5	4 to 7	5.5	7 to 14	10.5
1 to 2	1.5	2 to 35	18.5	3 to 16	9.5	4 to 13	8.5	7 to 14	10.5
1 to 8	4.5	3 to 4	3.5	3 to 16	9.5	5 to 6	5.5	7 to 14	10.5
2 to 3	2.5	3 to 4	3.5	4 to 5	4.5	5 to 6	5.5	7 to 14	10.5
2 to 3	2.5	3 to 4	3.5	4 to 5	4.5	5 to 6	5.5	7 to 14	10.5
2 to 4	3.0	3 to 4	3.5	4 to 5	4.5	5 to 6	5.5	7 to 14	10.5
2 to 4	3.0	3 to 4	3.5	4 to 5	4.5	5 to 6	5.5	7 to 14	10.5
2 to 4	3.0	3 to 4	3.5	4 to 5	4.5	5 to 7	6.0	7 to 14	10.5
2 to 4	3.0	3 to 4	3.5	4 to 5	4.5	5 to 7	6.0	7 to 14	10.5
2 to 4	3.0	3 to 5	4.0	4 to 5	4.5	5 to 8	6.5	8 to 10	9.0
2 to 4	3.0	3 to 6	4.5	4 to 5	4.5	5 to 10	7.5	9 to 12	10.5
2 to 4	3.0	3 to 6	4.5	4 to 5	4.5	5 to 21	13.0	9 to 17	13.0
2 to 4	3.0	3 to 6	4.5	4 to 5	4.5	6 to 7	6.5	10 to 13	11.5
2 to 4	3.0	3 to 6	4.5	4 to 5	4.5	6 to 8	7.0	10 to 14	12.0
2 to 4	3.0	3 to 6	4.5	4 to 5	4.5	6 to 10	8.0	10 to 21	15.5
2 to 4	3.0	3 to 8	5.5	4 to 5	4.5	7 to 14	10.5	14 to 21	17.5
2 to 7	4.5	3 to 9	6.0	4 to 6	5.0	7 to 14	10.5	-----	-----
2 to 9	5.5	3 to 12	7.5	4 to 7	5.5	7 to 14	10.5	-----	-----

The average of all means for the 88 instances is 6.4 days.

TABLE 14.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Diphtheria, the per cent that the cases in each group were of All Cases of Known ages; the per cent that the Deaths in each group were of All Deaths at Known ages; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1896 which stated the ages.*

	Number and per cent of Cases and Deaths in certain Age-groups.																
Ages in groups of years.	All Known Ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50 and over.
No. of cases.....	*3,006	33	85	161	222	219	720	1020	595	263	129	94	68	59	31	13	14
Per cent the cases in each group were of all cases of Known ages..	100.	1.1	2.8	5.4	7.4	7.3	24.0	33.9	19.8	8.7	4.3	3.1	2.3	2.0	1.0	0.4	0.5
No. of deaths	570	18	36	63	73	67	257	196	73	17	14	4	4	3	0	0	2
Per cent the deaths in each group were of all cases in that group...	19.0	54.5	42.4	39.1	32.9	30.6	35.7	19.2	12.3	6.5	10.9	4.3	6.9	5.1	0	0	14.3
Per cent the deaths in each group were of deaths, Known ages..	100.	3.2	6.3	11.1	12.8	11.8	45.1	34.4	12.8	3.0	2.4	0.7	0.7	0.5	0	0	0.4
Per cent the deaths in special groups were of all deaths, Known ages		45.1					79.5		18.2			2.3					

* Does not include those cases or deaths where the age was not stated.

TABLE 15.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Diphtheria in each of the years 1892–96; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths.—Compiled from all reports for the years 1892–96 which stated the ages.*

Year.		Total No. included.	Per Cent of Cases and Deaths in certain Age-groups.											
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 Years and over
1892.	Cases.....	2,065	100	22.0	32.7	21.0	9.5	5.3	3.5	2.3	1.8	0.8	0.6	0.5
	Deaths.....	476	100	34.9	36.6	18.1	4.8	2.3	1.5	0.8	0.6	0.2	0	0.2
1893.	Cases.....	1,864	100	25.1	31.3	22.1	10.1	6.1	4.1	2.7	1.7	0.9	0.7	0.6
	Deaths.....	435	100	38.2	35.6	13.3	7.4	2.8	1.6	0.7	0	0.2	0	0.2
1894.	Cases.....	2,178	100	23.1	31.3	19.4	10.3	4.7	3.9	2.8	2.1	1.2	0.7	0.6
	Deaths.....	412	100	35.7	36.9	15.8	6.1	1.7	1.7	0.7	1.0	0	0	0.5
1895.	Cases.....	2,460	100	30.3	32.0	17.1	6.9	4.7	3.1	2.7	1.1	0.8	0.7	0.6
	Deaths.....	521	100	50.7	28.6	13.2	2.9	1.7	1.0	0.4	0.6	0.4	0.2	0.4
1896.	Cases.....	3,006	100	24.0	33.9	19.8	8.7	4.3	3.1	2.3	2.0	1.0	0.4	0.5
	Deaths.....	570	100	45.1	34.4	12.8	3.0	2.4	0.7	0.7	0.5	0.0	0.0	0.4
1892-96.	Cases.....	11,573	100	25.0	32.4	18.9	9.0	4.9	3.5	2.5	1.7	0.9	0.6	0.6
	Deaths.....	2,414	100	41.4	34.2	14.5	4.6	2.2	1.2	0.7	0.5	0.2	0.0	0.3

TABLE 17.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Diphtheria, in Michigan, during the four years and each of the four years, 1893-6; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of non-fatal cases, Years.	No. of cases included.	Age.—In Periods of Years. Per cent of (non-fatal) Cases in each Period of age.															
				All Ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.		
1893.	Males.....	11.9	660	100	23.6	33.6	18.5	10.5	5.3	3.8	2.0	1.1	0.8	0.6	0.3	0	0		
	Females..	15.0	769	100	19.0	26.8	17.2	11.3	8.6	5.9	4.6	3.1	1.3	1.2	0.6	0.3	0.3		
1894.	Males.....	11.9	788	100	22	34	20	10	5	3	2	2	1	.25	.25	0	0		
	Females..	14.8	978	100	19	27	21	12	6	5	4	3	2	1.3	0.4	0.2	0.3		
1895.	Males.....	10.6	855	100	29.4	35.8	17.3	6.3	4.2	2.2	2.5	0.4	0.8	0.7	0.5	0	0		
	Females..	13.5	1,084	100	21.3	30.5	18.7	9.3	6.5	4.8	4.1	2.0	0.9	1.0	0.5	0.3	0.1		
1896.	Males.....	10.7	1,080	100	21.7	36.1	20.2	10.4	3.8	2.6	1.4	2.0	1.1	0.4	0.3	0.0	0.1		
	Females..	12.6	1,356	100	16.9	32.0	22.4	9.9	5.5	4.6	3.6	2.5	1.4	0.7	0.4	0.1	0.1		
1893-6.	Males.....	11.2	3,383	100	24.1	35.1	19.0	9.4	4.5	2.9	2.0	1.4	0.9	0.5	0.3	0.0	0.0		
	Females..	13.9	4,187	100	18.8	29.4	20.1	10.5	6.3	5.0	4.0	2.6	1.4	1.0	0.5	0.2	0.2		

TABLE 18.—*Exhibiting, by Sex and in certain Age-groups, the per cent of persons who died from Diphtheria in Michigan, during the five years and each of the five years, 1892-96; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from Diphtheria.									
Year.	Sex.	Average age. Years.	No. of Deaths included.	Ages.—In Periods of Years. Per Cent of Deaths in each Period of Age.					
				All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.
1892.	Males.....	7.1	231	100	46	32	16	4	1
	Females.....	8.7	240	100	41	31	15	5	2
1893.	Males.....	8.1	207	100	43	34	9	10	3
	Females.....	8.8	228	100	34	37	17	5	2
1894.	Males.....	7.8	180	100	39	39	14	6	1
	Females.....	9.8	232	100	33	35	17	7	2
1895.	Males.....	6.4	250	100	57	26	13	2	1
	Females.....	8.3	271	100	45	31	14	3	3
1896.	Males.....	6.4	271	100	45	36	11	4	2
	Females.....	7.0	299	100	45	33	14	2	3
1892-96.	Males.....	7.1	1,139	100	44	35	13	5	2
	Females.....	8.4	1,270	100	39	34	16	4	3

AVERAGE DURATION OF DIPHTHERIA.—FATAL AND NON-FATAL CASES.

*Fatal Cases.*TABLE 19.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from Diphtheria, in Michigan, during the year 1896. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Diphtheria.											
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Deaths in each Period of Days.								
			All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
1893.	Males.....	192	100	35	43	13	5	2	1	0	0
	Females.....	203	100	38	36	15	6	3	1	.5	0
1894.	Males.....	131	100	39	37	13	5	1	0	2	3
	Females.....	167	100	29	36	20	7	2	2	-----	.6
1895.	Males.....	135	100	39	38	13	6	2	0	0	2
	Females.....	153	100	44	32	12	7	3	1	0	1
1896.	Males.....	139	100	53	26	9	8	2	0	1	1
	Females.....	155	100	59	24	8	5	3	0	1	0
1893-6.	Males.....	597	100	41	37	12	6	2	0	1	2
	Females.....	678	100	42	32	14	6	3	1	1	0

The average duration in 1896 of fatal cases was, for males 7.6 days and for females 6.5 days.

TABLE 20.—*Exhibiting, by Sex of patient, the Duration (in days) of Non-Fatal cases of sickness from Diphtheria, in Michigan, during the four years and each of the four years, 1893-96. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Diphtheria.											
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of non-fatal Cases in each Period of Days.								
			All Periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 days and over.
1893.	Males.....	442	100	9	35	25	14	9	4	2	2
	Females.....	517	100	8	37	27	12	8	4	2	2
1894.	Males.....	503	100	8	31	23	20	9	6	1	2
	Females.....	606	100	9	30	20	20	12	4	2	3
1895.	Males.....	394	100	8	32	29	16	8	4	2	2
	Females.....	531	100	10	32	32	14	6	3	2	4
1896.	Males.....	502	100	12	29	25	14	10	4	2	4
	Females.....	655	100	9	34	27	15	8	3	2	1
1893-96.	Males.....	1,841	100	9	32	26	16	9	4	2	3
	Females.....	2,309	100	9	33	26	15	8	4	2	2

In Table 20 it may be seen that in non-fatal cases of diphtheria for the year 1896, the duration of sickness in five-day periods was nearly the same in both sexes; that 67 per cent of the males and 68 per cent of the females recovered before the fifteenth day of sickness.

The average duration in 1896 was 14.3 days for males, and 13.4 days for females.

DIPHTHERIA IN ST. CLAIR COUNTY.

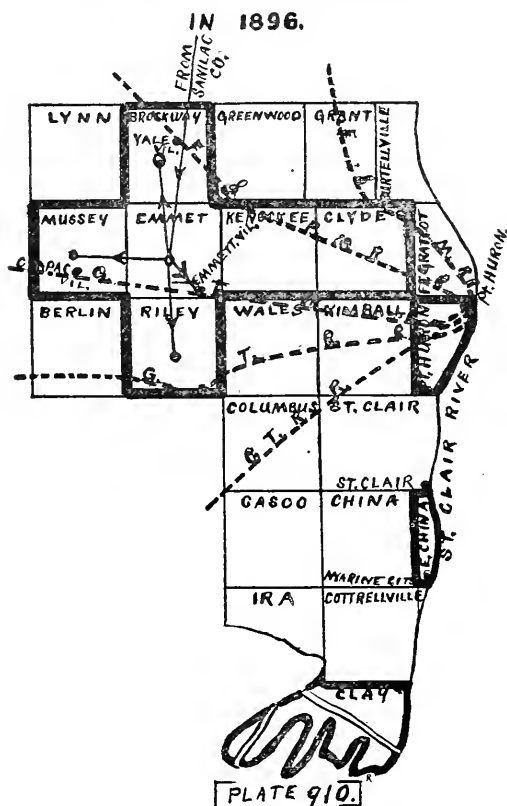
Diphtheria was present in this county throughout the year. Of the 30 health jurisdictions (3 cities, 4 villages, and 23 townships) in the county, 13 jurisdictions (2 cities, 4 villages, and 7 townships) were infected. In the 13 infected jurisdictions, there occurred 18 outbreaks with 115 cases, of which 22 were fatal. Of these, however, in the calendar year 1896, there were only 104 cases with 21 fatalities; the remaining 11 cases and 1 death occurred in the calendar year 1897. Precautionary measures were enforced as follows:

Precautionary measures.	Localities.	Out-breaks.	Cases.	Deaths.
Isolation or disinfection or both not mentioned or statements doubtful	7	8	36	10
Disinfection enforced; isolation doubtful	1	1	1	0
Isolation enforced; disinfection doubtful	2	2	5	0
Disinfection enforced; isolation neglected	1	1	4	0
Isolation enforced; disinfection neglected	1	1	1	0
Isolation and disinfection, both neglected	1	1	56	10
Isolation and disinfection, both enforced	4	4	12	2

The accompanying map shows the territory infected and the movements of the contagion in those jurisdictions reporting the same. Attention is called to the fact of how the infection spread from the township of Emmet. The correspondence of the health officer of Emmet township with this office contains interesting and practical points for health officers and the public.

DIPHTHERIA IN ST. CLAIR CO.

IN 1896.



In the accompanying map, the infected area is that within the heavy lines. Heavy dash lines indicate the railroads. Lines with arrow-heads indicate the direction of the movements of the infection, as reported.

Diphtheria in Emmet Tp., St. Clair Co.

From April, 1896, to Feb. 3, 1897, a severe epidemic of diphtheria raged in Emmet Tp., St. Clair Co. Owing to the failure of the attending physician to make the diagnosis of diphtheria in the first instances, it spread rapidly, 56 cases of which there were 10 fatalities resulted, 49 cases of which there were 9 fatalities occurred in the calendar year of 1896. In this outbreak the health officer reported "all cases but one traced to preceding cases," and the source of contagium: "Man from Sanilac Co. married a young lady here—coming to her home before having recovered fully from D—also her friends visiting him during his illness."

The correspondence relative to this outbreak is as follows:—

September, 1896, on a weekly card-report, A. J. Abbott, M. D., health officer of Emmet Tp., St. Clair Co., reported an outbreak of diphtheria in his jurisdiction. Secretary Baker immediately sent a letter of instructions in regard to precautions to be taken to check the spread of the disease, and also mailed to Dr. Abbott pamphlets to be distributed among the sick of the infected district.

Sept. 29, 1896, Dr. Abbott acknowledged receipt of the publications, and continuing said:—

"I submitted same to Prest. of my board together with my opinion that the cases last week reported tonsillitis were diphtheria, and was instructed to wait till the attending physician pronounces them diphtheria. The history of this epidemic is this: in the first family affected, so far as my knowledge goes, three little ones had what was called membranous croup; the first mild the other two fatal. Other neighboring families had more or less severe attacks of sore throats. In the family next farm two have died; these were diagnosed follicular tonsillitis, but admission was made that it was communicable by contact but not by fomites and in each fatal case immediate burial was directed and done.

"The doctor wrote me to say the cases were not diphtheria, he having made repeated bacteriological examinations of the exudate and submitted three specimens to Dr. Vaughan who confirmed his own findings.

"He said he had taken precautions such as should be done in diphtheritic cases. A consulting physician of experience most emphatically states the cases are true diphtheria.

"The history seems to me clearly that of diphtheria, but in the face of my board's action, together with the fact that it would mean a gladiatorial contest to interfere, I have not done anything. The cases are all reported better now. The first case was about six weeks or more ago and has been followed by others since."

Oct. 2, 1896, the Secretary of this Board acknowledged the receipt of Dr. Abbott's letter and continuing said:—

"Act 137, laws of 1833, says that whenever the health officer shall receive reliable notice, or *shall otherwise have good reason to believe* that there is within his jurisdiction any dangerous communicable disease to immediately investigate the same, and to act promptly for the restriction of the disease, and the *President of your local board of health cannot set aside a State law*, it would require the action of the entire board of health. You should proceed to immediately investigate the subject under the law, and to take all proper precautions to prevent the disease from spreading until your local *board of health* shall otherwise instruct you. I have no doubt but that it is diphtheria, and to say the least it is *certainly a dangerous disease as it is causing deaths*, and the necessary precaution should be taken

to prevent it from spreading. I trust that your local board of health will stand by you and instruct you to take the necessary precautions, instead of making the fatal mistake of ordering you to wait until it is reported to you. I herewith enclose a circular letter relative to diphtheria, and by mail I send to you a few pamphlets bearing upon the restriction and prevention of diphtheria, which I trust you will distribute where they will do the most good."

Oct. 3, 1896, Dr. Abbott replied as follows:—

"Yours of the 2nd inst. rec'd. Regarding my right as H. O. to enter a house where the attending physician declares no contagious disease exists, I have entertained doubts,—probably doubts I should not have entertained in other cases, but when I feel certain I shall meet with opposition and insult and that every injunction I should lay upon the friends of the sick would be most studiously disregarded, I have felt there were at least prudential reasons for non-interference till there seemed a reasonable probability of being able to do some good by entering the premises. I am no gladiator and I assure you I should need to be to interfere in those cases reported tonsillitis so long as their Dr. says they have not diphtheria. The Dr. says he is taking every care as though it were diphtheria, and no one goes there who can stay away. They bury the dead immediately after death so it does not appear that the public is in danger now. However I have taken steps to investigate further, and if anything is lacking for public safety I shall endeavor to do my part. * * *"

Oct. 5, 1896, Secretary Baker replied as follows:—

"Your letter of October 3 relative to diphtheria is before me for which please accept thanks. I have no doubt as to the right of the health officer, whenever he has good reason to believe that there is within his jurisdiction a dangerous communicable disease, to investigate the same. The law plainly says that he shall immediately investigate.

"Relative to the instructions you might give being disregarded, Sec. 2 of Act 137, laws of 1883, says that whoever shall violate the provisions of section one of said act or the orders of the health officer made in accordance therewith, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine or imprisonment. If your orders or the law are being violated you should report all such violations to the Supervisor, whose duty it is under the law to prosecute for all such violations, the prosecuting attorney conducting the suit if so requested. I am well aware that it sometimes requires one to be somewhat of a gladiator to enforce the laws of the State, but it should be done at all times, and especially so where the public health is interested, and lives are being sacrificed to satisfy the whim of some unscrupulous person who has no interest in public-health work.

"You say that the 'Dr. says that he is taking every care as though it were diphtheria and no one goes there who can stay away and they bury the dead immediately after death so it does not appear that the public is in danger now.' Do I understand that the premises are placarded and that isolation is being enforced the same as in diphtheria? If so what objections can the attending physician have to reporting it as diphtheria, and thus give the public safety the benefit of the doubt?

"I am very glad to know that you have taken further steps to investigate, and I trust that you will enforce the law in the interest of public health.

"In your former letter you said that this Dr. had made bacteriological examinations, and that Dr. Vaughan had confirmed his statement that it was not diphtheria. I should like very much to know the name of the Doctor in order that I may be able to write Dr. Vaughan relative to the subject, as the subject is a very important one and demands further investigation. * * *"

Oct. 7, 1896, Dr. Abbott wrote as follows:—

"Yours of the 5th inst. recd. I sent Dr. Paterson of Capac to pronounce upon those cases of so called follicular tonsillitis, and he telephoned me the one now sick has diphtheria, but refuses to say what the others had.

"I swabbed the sick child's throat with cotton and have sent it to the Laboratory of Hygiene at Ann Arbor subject to your direction so that you may be able to instruct me positively. I have quarantined the place, and shall endeavor to prevent the further spread of the disease. Dr. — of — still insists the disease is not diphtheria, but just as bad, although he did not deny having told in — the cases were diphtheria of the worst type, and I am informed he has placarded other cases near — diphtheria. * * *"

Oct. 8, 1896, in acknowledging the last letter from Dr. Abbott, Secretary Baker said that he was glad to know that precautions were taken even at this late date, and stated that he had written Dr. Vaughan for a report of the examination of the exudate sent him from Emmet.

Oct. 8, 1896, Secretary Baker wrote to Dr. Vaughan stating that he believed this outbreak was one of diphtheria, and would like to have the result of the examination of the exudate. Secretary Baker wrote further:

"Relative to this subject Dr. — of —, also claims to have sent to you exudate at three different times, and that you confirmed his own tests as to its *not* being diphtheria. I should also like to receive from you a full statement relative to this subject, and shall appreciate your kindness if you will write to me."

Under date of Oct. 9, 1896, Dr. Vaughan informed this office that while writing the letter the sample was received, and that the best effort will be made to ascertain whether or not the bacillus is present. About one week later Dr. Vaughan wrote the Secretary as follows:—

"So far, we are unable to make anything out of the sample of sputum sent by Doctor Abbott of Emmet. Please understand that this by no means indicates that this is not one of diphtheria. The piece of membrane was so thoroughly dried before it reached us, not having been properly prepared, that it is practically impossible to do anything with it."

Secretary Baker wrote these facts to Dr. Abbott at Emmet.

Diphtheria in Huron Co.

Throughout the year of 1896 diphtheria raged extensively in Huron Co. Of the 32 health jurisdictions (5 incorporated villages and 27 townships) in the county, 14 jurisdictions (1 village and 13 townships) were infected with the disease. In the 25 outbreaks which occurred in the 14 jurisdictions, there were 175 cases with 34 fatalities.

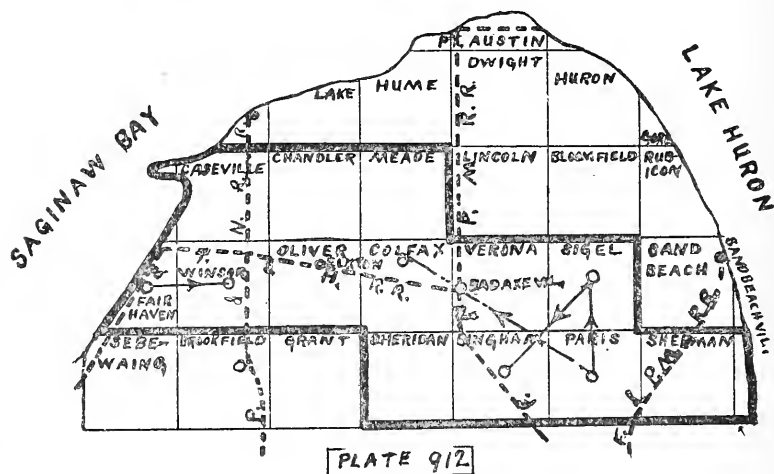
Precautionary measures were enforced as follows:

Precautionary measures.	Localities.	Outbreaks.	Cases.*	Deaths.*
Isolation or disinfection or both not mentioned or statements doubtful	5	6	50	5
Disinfection enforced; isolation doubtful	1	1	7	4
Isolation enforced; disinfection doubtful	2	3	8	0
Disinfection enforced; isolation neglected	4	4	27	8
Isolation enforced; disinfection neglected	2	3	4	1
Isolation and disinfection, both neglected	3	3	10	1
Isolation and disinfection, both enforced	3	4	14	5

* The total numbers of localities, outbreaks, cases and deaths in these columns do not agree with the numbers stated in the preceding paragraph, for the reason that for purposes of making diagrams and tables relative to definite outbreaks, it is necessary to leave out the cases and deaths in those localities where there is no way of determining the beginning and ending of an outbreak.

From the accompanying map it may be observed that the F. & P. M. R. R. and the S. T. & H. R. R. run through the heart of the infected district.

DIPHTHERIA IN HURON CO. IN 1896.



In the accompanying map, the infected area is that within the heavy lines. Heavy dash lines indicate the railroads. Lines with arrow heads indicate the direction of the movements of the infection, as reported.

From the accompanying table it may be observed that diphtheria was present with more or less prevalence in Huron Co. during the past eight years.

The following table exhibits the number of localities, outbreaks, cases, and deaths for each of the eight years, 1889-96.

Year.	Localities.	Outbreaks.	Cases.	Deaths.
1889.....	4	4	5	0
1890.....	4	4	4	1
1891.....	11	13	36	6
1892.....	9	9	50	7
1893.....	20	24	151	47
1894.....	10	11	182	30
1895.....	12	21	187	35
1896.....	14	25	175	34
Totals.....	84	111	790	160

It was alleged that the source of contagium in Bad Axe village was by means of a mouth organ used by a diphtheritic patient in Elkton, but investigation failed to substantiate the supposition. The accompanying map shows that Sigel Tp. was infected by contagium from Paris Tp., Winsor Tp. from Fair Haven Tp. and Bad Axe Vil. from Elkton. In Meade, Colfax, and Bingham Tps. the contagium was supposedly from outside their respective jurisdictions. In other outbreaks, the source of contagium was not stated, or when stated was indefinite.

From the accompanying table it may be observed that during the eight years there were 111 outbreaks in which there occurred 790 cases, including 160 deaths. At first the infected territory was mostly in the southwestern townships of the county and gradually extended until it embraced the territory as shown in the foregoing map of Huron Co. During the eight years, in all but nine outbreaks (in eight localities, with a total of 25 cases including 6 deaths) restrictive measures were neglected; one in 1891, two in '92, two in '93, and four in '96.

In 1893, Oliver Tp. had 35 cases including 10 deaths. In 1894, Oliver Tp. had 43 cases including 2 deaths, Paris Tp. had 47 cases including 17 deaths, and Chandler Tp. had 53 cases including 8 deaths. In 1895, Paris Tp. had 130 cases including 27 deaths. In 1896, Paris Tp. had 62 cases including 10 deaths.

In Huron county, during the eight years, 1889-96, there were 16 outbreaks from which resulted 284 cases and 73 deaths, in which restrictive measures were neglected; an average of 17.75 cases and 4.56 deaths to the outbreak. Had restrictive measures been neglected in the 111 outbreaks, which occurred in Huron county during the 8 years, 1889-96, it is reasonable to suppose that there would have occurred (17.75×111) 1,970 cases, and (4.56×111) 506 deaths. But there occurred 790 cases and 160 deaths; thus indicating a saving of $(1,970 - 790)$ 1,180 cases and $(506 - 160)$ 346 deaths, because of restrictive measures in Huron county, during the eight years.

In November, 1894, at the request of the State Board of Health, Dr. J. W. Hauxhurst of West Bay City, made an investigation of the sickness in the townships of Oliver, Chandler, Lake, Hume, Dwight, and Lincoln, and the report of his investigations, dated Nov. 5, 1894, is published in the Annual Report of this Board for the year 1895, pp. 208-9.

Diphtheria in Wayne County.

Diphtheria prevailed in Wayne county throughout the entire year. In the 29 health jurisdictions (2 cities, 8 villages, and 19 townships) in the county, 16 jurisdictions (2 cities, 3 villages, and 11 townships) were infected. In the 16 jurisdictions, 17 outbreaks occurred; a total of 1,162 cases with 283 deaths. Detroit contributed 848 cases with 213 deaths, thus leaving 314 cases with 70 deaths as having occurred in the county outside of Detroit.

Precautionary measures were enforced as follows:

Precautionary measures.	Localities.	Outbreaks.	Cases.*	Deaths.*
Isolation or disinfection, or both not mentioned, or statements doubtful.....	5	5	79	11
Disinfection enforced, isolation doubtful.....	0	0	0	0
Isolation enforced, disinfection doubtful.....	2	2	10	3
Disinfection enforced, isolation neglected.....	2	2	8	1
Isolation enforced, disinfection neglected.....	0	0	0	0
Isolation and disinfection, both neglected.....	2	2	102	21
Isolation and disinfection, both enforced.....	3	4	10	3

* The total number of localities, outbreaks, cases and deaths in these columns do not agree with the numbers stated in the preceding paragraph, for the reason that for purposes of making diagrams and tables relative to definite outbreaks, it is necessary to leave out the cases and deaths in those localities where there is no way of determining the beginning and ending of an outbreak, as in Detroit and Springwells Tp. in Wayne county.

DIPHTHERIA IN WAYNE CO. IN 1896.



[PLATE 91.]

In the accompanying map, the infected area is that within the heavy lines. Heavy dash lines indicate the railroads. Lines with arrow-heads indicate the direction of the movements of the infection, as reported.

From the accompanying map of Wayne county, it can be observed that Detroit was nearly surrounded by infected territory. In some of the townships diphtheria was not distinctly traced to Detroit, but the localities were contiguous to Detroit, and it seems probable that the disease was communicated from Detroit, directly or indirectly.

Diphtheria in Springwells Tp., Wayne Co.

May 9, 1896, F. J. Clippert, M. D., health officer of Springwells Tp., Wayne Co., wrote to the Secretary of this Board as follows:—

"Within the past ten days we have had an outbreak of diphtheria and scarlet fever, in two separate homes. On careful investigation I learn that the diphtheria patient had been playing with a neighbor's children, who had all suffered from sore throat. I surmise that the ailment named was diphtheria in a mild form. I elicit the fact that one case followed another (four in all), in rapid succession, in the neighbor's family. I regret to say that one child has died as a result of exposure. The disease was malignant, involving the rectum, etc."

May 12, 1896, Secretary Baker forwarded to Dr. Clippert letters and pamphlets relative to the restriction and prevention of the disease, and asked for the necessary reports to be made in accordance with law, to this office.

May 23, 1896, Dr. Clippert sent to this office his final report relative to this disease, and on July 13, 1896, he sent an outbreak report stating that two cases had already occurred, and on Aug. 5, 1896, he sent another outbreak report stating that one more case had occurred. Further reports to this office showed that diphtheria was prevalent during the year 1896 and well along in the year 1897; sixty days not having elapsed between the reported outbreaks, they are treated as the same outbreak.

Sept. 2, 1896, Dr. Clippert again wrote to this office as follows:—

"During my absence 'Diphtheria' became epidemic—eight cases having been reported to date with two deaths—as a result of laryngeal invasion. No new cases reported since the 29th. I am unable to trace the source of infection in all cases—in several, I believe it to be due to so-called 'Follicular tonsillitis'. I relate a case in point: A child aged 2½ years took sick on the 21st of Aug. A physician was called, and he made a diagnosis of 'Follicular tonsillitis' and treated the child until the 29th. I returned home on the 30th, was called to see the little patient, and made a diagnosis of diphtheria. A great number of children have been exposed to this case. I regret to add that the patient died this morning as a result of laryngeal invasion. The doctor first in attendance claims that Parke, Davis & Co. made a bacteriological examination of the exudate, and reported that it was not diphtheria. Two physicians called in consultation agree that it was a well-marked case. So much for laboratory diagnosis.

"We are doing all possible to prevent the spread of the disease and I trust that our efforts may be successful."

Sept. 7, 1896, Secretary Baker wrote to Dr. Clippert as follows:—

"Your very interesting letter of Sept. 2, comes to my notice. I thank you for the information, and I shall take steps to investigate the subject. I think your method is correct, that a disease plainly clinically diphtheria should be so considered even though the bacteriological diagnosis should fail to detect the Löffler bacillus. The bacillus was probably there, but the bacteriological examination failed to show it. But in streptococcus diphtheria the mortality is about nine per cent, I believe. Bacteriological diagnoses are very valuable; but, in case the Löffler bacillus is not found, all precautions for the restriction of the disease should *not* be stopped. I should be glad to know the name of the physician who sent the membrane to Parke, Davis & Co."

Sept. 5, 1896, Dr. Clippert wrote as follows:—

"We had two deaths from membranous croup during the past week; many of our diphtheria cases suffer from cough and laryngeal infection. Is it common to other places?"

In his reply of Sept. 8, 1896, Secretary Baker said:—

"Relative to diphtheria cases suffering from cough and laryngeal infection, the reports to this office do *not* indicate that it is very common. But, today I received a postal-card weekly report of sickness

in Warren village and vicinity, from Dr. —, on which he reports 'Croup, membranous, case, 1' and in a side note he says: 'The case of membranous laryngitis was non-specific.' He does not say how he knows, and I am under the impression that, even if due to irritant chemical substance, it was still caused by some specific micro-organism, although possibly not Löffler bacillus. Is not this your view?"

Sept. 7, 1896, Secretary Baker wrote to Parke, Davis and Co. stating the facts in this case and asking that they kindly inform this office relative to the matter. Secretary Baker's letter was referred to Dr. Chas. T. McClintock, who replied Sept. 8, 1896, as follows:—

"Some days ago a stranger called at the laboratory, introduced himself as Dr. —, from —, and asked me if I would make an examination for him. He had a small piece of membrane in a bottle. This was stained and examined, he stating meanwhile that he had at first suspected the case to be one of diphtheria, but afterwards, from the clinical conditions, had decided that it was not—still, wanted the examination made.

"On looking at the stained preparation I said to him, as nearly as I can remember, as follows:—

"There are a few germs present that are suspicious, but they are not typical, and in my opinion the case is probably not diphtheria. Then I pointed out to him how impossible it was to make a certain negative diagnosis in such cases, and advised him to watch the case, and make a culture from it. This was the last I had heard of the matter until your letter to-day.

"Allow me to say, further, that we make here many examinations of this kind for the local physicians. This is purely a matter of accommodation, as no charge is ever made for such. In every case where the results are apparently negative it is our custom to warn them that the diagnosis is not, and cannot be, positive, and they are always advised to make cultures, or second cultures in case the first have been made.

"We have had it happen several times that a culture was negative, but another made some hours later showed abundant Löffler germs. This happened in the case of one of the laboratory assistants, and not until the third culture in the series was examined, this being made some 24 hours after the first one, could the germs be found. With such experience in mind you may be sure that we never make the statement that the case is *not* diphtheria. This being true for blood-serum cultures, when the probability of finding the germs, if present, is at least ten times as great as for membrane examinations you can see that one would be more than foolhardy to state positively from such an examination that the case was not diphtheria."

Sept. 10, 1896, Secretary Baker by letter thanked Dr. McClintock for his letter, and continuing said:—

"I am very glad to have the statement. I expect to publish it. Its teaching seems to be badly needed by medical men.

"The patient from whom the membrane was taken died, therefore the disease was a 'dangerous' one. There was membrane-sloughing in the throat, therefore, *clinically* it was diphtheria? As I tried to maintain in the discussion at Ann Arbor, I think such cases should be restricted, regardless of the failure to find the Löffler bacilli. * * * This case at Delray illustrates the results of neglecting to restrict cases of diphtheria in which the Löffler bacilli are not found,—eight cases with two deaths had resulted up to Sept. 2; and two cases of membranous croup have since been reported to have died during the week ending Sept. 5. These may not be additional to the eight."

After receiving the reply from Dr. McClintock, Secretary Baker caused to be hektographed a circular entitled "A New Danger to Public Health," which he sent to the leading Journals of the State. The circular said:—

"In 1888 the State Board of Health found it difficult to induce the people of Michigan to believe that mild cases of diphtheria were really diphtheria and should be restricted. Now, since so many physicians have come to believe that there can be no real diphtheria without the presence of the Loeffler bacillus, it is proved that cases of sore throat so mild that heretofore they would have no attention whatever are found to have the bacillus in the throat. No objection is now made by physicians who are bacteriologists to the restriction of these mild cases because it is now apparent that they may spread the disease; but, strangely enough, the difficulty now, with this class of practitioners, is in restricting even severe cases in which the Loeffler bacillus is not found.

"Statistics of some such cases indicate that that form of diphtheria in which the Loeffler bacillus is not present, or at least not found, is a *dangerous communicable disease*, the case mortality being about nine per cent,—about the same rate of mortality as from typhoid fever, therefore, *failure to find the Loeffler bacillus does not excuse a physician or health officer from reporting and restricting diphtheria and every case of suspected diphtheria.*

"A sad instance of such failure, is where two deaths and many cases have just occurred and the disease is still spreading, apparently as the result of a wrong idea on the part of a physician,—that if the Loeffler bacillus is not found no precautions need be taken. The health officer in reporting it says, relative to the source of infection." [Secretary Baker here quotes a part of Dr. Clippert's letter of Sept. 2, previously quoted, and following said letter of Dr. Clippert's, quotes the letter from Dr. McClintock, of Sept. 8, also previously quoted and finally concludes as follows:—]

"The fault seems to lie with those who misinterpret the results of such bacteriological tests. If the bacillus is found, the disease is certainly diphtheria. But because the bacillus is not found it is very wrong to say that a given case of sickness is not diphtheria."

Dr. Clippert, subsequently, several times wrote to this office, stating the condition of the sickness in Springwells, the difficulties in the way of enforcing necessary precautionary measures, and in two cases of diphtheritic croup stated how valuable antitoxin was in the treatment.

Dec. 10, 1896, a letter and a petition with eight signatures were sent to Governor Rich. The petition stated: "Our present water supply is contaminated and unfit for use, and the prevalence of diseases such as diphtheria and typhoid fever in this section is directly traceable to this cause, cow stables and outhouses,—we respectfully petition you to instruct the State Board of Health to investigate the matter and make an analysis of the water, etc."

Governor Rich referred the correspondence to the Secretary of the State Board of Health for action.

Dec. 22, 1896, Secretary Baker visited Delray, and made examinations of the sanitary conditions in Springwells, and on Dec. 23, 1896, made a written report to Governor Rich. The report pertains to sewerage, water-supply, disposal of excreta, etc., which bear relation to typhoid fever. As such conditions have never been shown to bear close relations to diphtheria, the report of Secretary Baker is not published here, but may be found in the article, in this report, relative to typhoid fever.

BACTERIOLOGICAL DIAGNOSIS IN THE CITY OF KALAMAZOO.

September 19, 1896, Dr. A. W. Crane, bacteriologist for the city of Kalamazoo, wrote to Secretary Baker of this Board commending the work of this Board, and continuing said:—

"In this city, after a careful paper, read before our local Academy of Medicine, by Dr. A. H. Rockwell, Health Officer of Kalamazoo, we are agreed to recognize as *diphtheria* all inflammations of mucous membranes caused by the Klebs-Löffler bacillus whether or not there is a visible membrane and to recognize as *diphtheroid* (Osler) all inflammations and tonsillitis simulating diphtheria but not caused by the Klebs-Löffler bacillus. Not only cases of diphtheria but all cases which *clinically* would be diagnosticated as diphtheria, especially laryngeal cases, whether or not diphtheria-bacilli are found, are placarded, until farther bacteriological examinations can make clear the diagnosis.

"No bacteriological examination is thoroughly reliable if made from a swab used within six hours of the application of antiseptics to the throat. The bacilli are present in the mouth and throat *when the membrane is forming and when it is breaking down.* But during the course of the disease while the mouth and throat are kept clean by washes, gargles and swabbing, the specific germs may be found only in the deeper portions of the membrane. The bacteriologic examination is not without certain qualifications. It must be done properly, and the conditions of the patient are almost as important as the conditions of the culture tube and incubator.

"In Kalamazoo the following plan is in force:—

"Any physician may obtain a sterile swab and culture tube free of charge at the Health Office laboratory, or a drug store which is open nights and Sundays. The patient to be examined is given a drink of water to clear the throat of mucus. The tongue is depressed and the swab rubbed firmly over the affected surface. The swab is now rubbed gently over the surface of the solidified blood serum in the culture tube, so as to plant the germs from the throat upon the culture medium. The swab is returned to its own tube and both tubes sent at once to the laboratory where a second culture tube is inoculated by the bacteriologist from the same swab. These tubes are kept at 37° C. for about twelve hours (often less) after which a portion of the growth on the serum-surface is transferred to a cover-glass, stained with Löffler's alkaline methylene-blue solution, and examined under the microscope. Diphtheria bacilli grow rapidly and luxuriantly on pure blood serum, while the other throat germs do not get much of a start until twenty-four or even forty-eight hours. If bacilli are present which have the morphological characteristics of the Klebs-Löffler bacilli and show the *end-staining* reaction, the report is made that the Klebs-Löffler bacilli have been found. If however (as is rare) bacilli are present which have the morphologic characteristics of the Klebs-Löffler bacilli but *do not* show the end-staining reaction with Löffler's solution, the report is made that bacilli are found which may be either diphtheria bacilli or pseudo-diphtheria bacilli. The patient is isolated and treated for diphtheria. In the meantime a tube of alkaline bouillon is inoculated with the suspected germs. If at the end of 48 hours the bouillon becomes acid in reaction the bacilli are called the Klebs-Löffler; if the bouillon remains alkaline the bacilli are called the pseudo-diphtheria organisms. The hypodermatic injection into an animal of a quantity of this bouillon would constitute a test for virulence. In any case the quarantine is not maintained after the recovery of the patient when the true Klebs-Löffler bacilli are not found. If requested by the attending physician or the health officer, the bacteriologist inspects the case personally and applies the swab himself.

"Thus by means of the bacteriological examinations we know in what cases to give the diphtheria antitoxin, and when and how long to maintain the quarantine. Diphtheria-antitoxin has effect only, in cases of true diphtheria caused by the Klebs-Löffler bacillus. The city of Kalamazoo provides free the administration of the antitoxin in cases of the city poor. It also provides free the bacteriological examination. The city is thus afforded the best obtainable protection by the early detection of true diphtheria and the prompt cure of cases. Of the humanitarian aspect I need not speak. The rapid cure by antitoxin saves expense to the city in cases among the dependent poor who must be furnished with provisions and attendance during quarantine. The bacteriological examinations also save expense to the city by maintaining quarantine only so long as the patient is a real source of danger. A further saving is effected by limiting the use of the expensive antitoxin to cases of genuine diphtheria, where only it can do good.

"The average practitioner is not in a position, and can not be considered competent, to make a bacteriological examination in a case of suspected diphtheria. The bacteriological method is most efficient in a city the size of Kalamazoo where all parts are accessible and where a report can reach the physician promptly in 10 or 12 hours. Usually the specimen is sent in at evening and the report given in the morning.

* * * * *

"I believe that Michigan is abreast with any State in the Union in the efficiency of its public-health service. And I hope that the State Board will encourage the establishment of laboratories in connection with local boards of health where chemical and microscopical work can be properly performed."

ISOLATION HOSPITALS FOR THE CITY OF DETROIT.

COPY OF LETTER TO HON. HAZEN S. PINGREE, MAYOR OF DETROIT, RELATIVE TO NEED FOR "ISOLATION HOSPITALS", "DISINFECTING STATIONS", "SANITARY INSPECTORS", ETC., IN DETROIT, AND THE GREAT MONEY LOSSES CAUSED BY NON-RESTRICTION OF COMMUNICABLE DISEASES IN DETROIT.*

Hon. Hazen S. Pingree, Mayor of the city, and member of Board of Health, Detroit, Michigan:

Dear Sir:—I am informed that I am one of a committee of which you are chairman to prepare a statement relative to the need for isolation hospitals in Detroit.

Detroit is losing inhabitants by one of the most extravagantly-expensive methods,—by deaths, from the ordinary preventable causes, of children before they reach the age of productive labor. Deaths in old age, after the close of productive effort, do not involve money loss, but only grief. Deaths of children involve grief and great money loss. Objection has been made that proper health work in Detroit costs too much money. The fact has been overlooked that for want of proper public-health work in Detroit great money losses have been needlessly incurred. For instance, during the last month (March 1892) the deaths from only two of the preventable diseases, diphtheria and scarlet fever, were 42 more in Detroit than there would have been if the death-rate from them had been the same as in Cincinnati, 44 more than there would have been if the Chicago death-rate had prevailed, and 54 more than there would have been if at the same rate as in Cleveland. If we say that there were forty more than the average city permits (in the same number of inhabitants), and estimate the cost of raising each child to the age at which these children died, as five hundred dollars, there is apparent a loss, during the month of March, of \$20,000,—a sum sufficient to build two good isolation hospitals, such as was asked for by the health department of Detroit.

* This subject was recommended and published by hektographed copies and in local newspapers, but the subjoined letter was not published in the Annual Report for 1892, as it should have been, therefore it is here published.

In 1891-2, owing to the great prevalence of the contagious diseases (especially diphtheria and scarlet fever) in Detroit, the State Board of Health, at its regular meeting held in Lansing, April 12, 1892, adopted resolutions appointing a committee consisting of the President and four other members to visit Detroit to confer with the health officials, and other city officials if practicable, concerning the difficulties under which the Detroit Health Officials and practicing physicians were laboring for the restriction and prevention of the dangerous communicable diseases.

A large amount of correspondence passed between this Office and the Detroit Health Officer. This correspondence concerning the prevalence of the dangerous diseases in the city, is published in the Annual Report of the Secretary for the year 1893, pp. 196-211.

A special meeting of the State Board of Health was called to be held at the Russell House, Detroit, April 28, 1892. The Mayor, the city Health Officials, many practicing physicians and others were invited to the meeting and were present.

An interesting and important meeting was held, the minutes of which together with statements of some of the prominent citizens of the city relative to the sanitary conditions existing therein, were published in the Annual Report of the Secretary of this Board for 1892, pp. li-lxi and in Reprint No. 185 of this Board. Contagious-disease or "isolation" hospitals appeared to be the best solution in checking the spread of the diseases, and after some discussion, resolutions were adopted recommending the appointment of a committee consisting of Mayor Pingree, Secretary Baker of the State Board of Health, and Health Officer Duffield to draw up a statement of the great need for contagious-disease hospitals. Not hearing from Mayor Pingree or Dr. Duffield, on this subject, Secretary Baker addressed to His Honor, Hazen S. Pingree, the Mayor of Detroit, the accompanying letter.

I do not claim that one or two isolation hospitals would be all that is necessary to place the public-health work in Detroit on a proper basis. The system is antiquated and inadequate in other respects than lack of isolation hospitals; but isolation hospitals are absolutely demanded by the State laws, and are essentials for the restriction of such dangerous contagious diseases. They need not necessarily be specially-constructed buildings, although preferably so. They may be cheap but comfortably planned isolation hospitals, with an attached building for convalescents, and a cottage, which should be constantly maintained, to which a family can be removed temporarily during the disinfection of their residence. Every isolation hospital should also have a complete disinfecting plant, and a closed vehicle for the removal to it of infected articles from residences, and a proper vehicle for the return of the goods.

For the proper isolation of persons and things infected with dangerous diseases, unless a guard is at once set, the board of health should have skilled officers to visit every infected place at least daily and see that the orders for complete isolation are understood.

The proper plan for the restriction of a dangerous communicable disease is much the same as for the restriction of a fire. The public look to the fire department to restrict the fire, and should look to the health department to restrict the disease. They cannot properly look to the family, nor to the physician. If the public expect it to be done, it must expect to supply the means, as to the amount of which, is not the risk of human life of as much consequence as is the risk to property endangered by fire? (I have not computed, but I think the money losses in Detroit from preventable diseases, recently, have greatly exceeded the losses by fire.) In the case of a contagious disease, as in the case of fire, if the first outbreak is neglected, the tendency is to extend until all available material is finally endangered. To commence a proper system in Detroit now is more expensive than it would have been many years ago; but the longer dangerous diseases are permitted to spread, the more difficult will be the final disinfection.

I sincerely hope that the city will awaken to the importance of the subject.

Very respectfully,

HENRY B. BAKER,
Secretary.

OFFICE OF THE SECRETARY
OF THE STATE BOARD OF HEALTH, }
Lansing, Mich., April 30, 1897.

SCARLET FEVER IN MICHIGAN.—YEAR ENDING DECEMBER 31, 1896.

During the year ending December 31, 1896, there were reported to the Secretary of the State Board of Health 406 outbreaks of scarlet fever in 332 localities in Michigan, which resulted in 2,646 cases and 81 deaths. Notwithstanding the marked improvement which has occurred both in promptness and accuracy of reports of local health officials to the central office, it is probable that not all cases of and deaths from scarlet fever are yet reported. For the year 1896 there were reported to the Secretary of State 106 deaths from scarlet fever, 25 more than were reported to this office; and the Secretary of the State Board of Health estimates that the deaths reported to the Secretary of State should be increased by about 40 per cent to equal the actual number of deaths which occur. According to this estimate, there were about 148 deaths from scarlet fever during 1896, in Michigan, instead of 81, as reported to the State Board of Health.

Some of the purposes of this compilation are stated on a preceding page of this Annual Report, in the article on "Communicable Diseases in Michigan in 1896."

Scarlet Fever in 1896, Compared with Previous Years.

From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by local health authorities throughout the State to furnish in their reports the information desired by the State Board. These facts, together with the constantly increasing population, make it difficult to determine the exact increase or decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom; and these facts should be borne in mind in referring to Table 1. While these facts might reasonably be expected to produce a constant increase in the reported prevalence of the disease, Table 1 shows that such increase has not occurred in the last three years, the reported cases and deaths, the cases and deaths per outbreak, and the fatality from this disease, during those years, having decreased, and in the last two years markedly so.

Table 2, exhibiting the number of deaths from scarlet fever, per 100,000 persons living, reported to the Secretary of State, represents the annual fluctuations of the total death-rate from scarlet fever in Michigan during the 29 years, 1868-96. A diagram graphically representing this fluctuation for the 24 years, 1868-91, is printed on page 234 of the Annual Report of this Board for 1895. By Table 2, it may be seen that since the registration of deaths was begun the death-rate from scarlet fever reported has never been so small as during the year 1896.

Distribution of Scarlet Fever by Divisions and Counties during 1896.

The following tables, 3 and 4, exhibit in different ways the distribution of scarlet fever in Michigan in 1896. The map which follows Table 4,

shows for each county of the State the sickness and death-rates per 10,000 inhabitants, the number of localities where the disease was present during the year, and the number of outbreaks which occurred in those localities. The map enables the reader to see the locations of the several counties.

TABLE 1.—SCARLET FEVER IN MICHIGAN —*Numbers of Reported Outbreaks, Localities (in which they occurred), Cases and Deaths; Average Numbers of Cases and Deaths Per Outbreak, and the Per Cent of Cases which proved fatal, as reported for each of the 15 years, 1882-1896; with the departure of the same for 1896 from 1895, and from the Average of the same for the 12 years, 1884-95.*

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Av. No of Cases per Outbreak.	Reported Deaths.	Av. No of Deaths per Outbreak.	Deaths Per 100 Cases.
1882.....		83	849		138		*16.0
1883†.....	164	150	1,802	11.	248	1.51	*14.0
1884‡.....	324	296	2,476	8.	230	.71	9.0
1885.....	356	337	2,750	8.	187	.53	7.0
1886.....	386	302	3,046	8.28	275	.71	9.0
1887.....	353	297	3,400	9.63	314	.89	9.0
1888.....	381	315	2,989	7.85	200	.52	6.7
1889.....	421	382	3,535	8.40	166	.39	4.6
1890.....	481	417	3,835	7.97	162	.34	4.2
1891.....	605	516	6,212	10.27	286	.47	4.6
1892.....	625	548	7,075	11.32	487	.78	6.9
1893.....	675	566	6,065	8.99	415	.61	6.8
1894.....	678	547	5,500	8.11	203	.30	3.7
1895.....	574	462	3,908	6.81	125	.22	3.2
1896.....	406	332	2,646	6.52	81	.20	3.1
Average for twelve years, 1884-1895.....	488	415	4,233	8.67	254	.52	6.0
Departure of 1896 from 1895.....	-168	-130	-1,262	-.29	-44	-.02	-.1
Departure of 1896 from the average for 12 years, 1884-95.....	-82	-83	-1,587	-2.15	-173	-.32	-2.9

* Probably in some instances only the fatal cases were reported.

† Use of the blank form "M" for weekly reports was begun in May, 1883.

‡ Use of the annual reports of health officers in compiling scarlet fever for communicable disease article was begun in 1884.

TABLE 2.—*Exhibiting the reported number of deaths from Scarlet Fever in Michigan per 100,000 population for each of the 29 years, 1868-96. (The data for this table were supplied by C. L. Wilbur, M. D., Chief of Vital Statistics of Michigan, Department of the Secretary of State.)*

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	
Death rate----		8.48	22.09	71.96	56.62	44.33	43.94	32.23	29.99	27.41	26.91	27.74	26.26	22.66	22.82	
Year.		1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Death } rate }	34.25	37.94	17.91	13.13	16.69	16.25	16.13	11.72	10.60	18.70	20.23	16.30	7.27	5.09	4.58	

TABLE 3.—*Exhibiting the Estimated Population* of Michigan for the year 1896, by tiers of counties (Upper Peninsula as one tier); also the number of cases of and deaths from Scarlet Fever REPORTED from each of the divisions for 1896, and the number of cases and deaths per 10,000 population of each division.*

Counties in Groups, most Northern ones First.			Estimated Population, 1896.*	Reported Cases of Scarlet Fever, 1896.	Reported Cases per 10,000 of Population.	Reported Deaths from Scarlet Fever, 1896.	Reported Deaths per 10,000 of Population.
State			2,315,517	2,646	11.43	81	.35
Upper Peninsula	Alger.	Mackinac.	219,561	235	10.70	10	.46
	Delta.	Chippewa.					
	Schoolcraft.	Keweenaw.					
	Luce.	Marquette.					
	Houghton.	Iron.					
Eleventh tier of counties.....	Ontonagon.	Menominee.	44,907	10	2.23	0	0
	Gogebic.	Dickinson.					
	Baraga.	Cheboygan.					
Tenth tier of counties.....	Emmet.	Presque Isle.	50,469	22	4.36	2	.40
	Charlevoix.						
	Leelanaw.						
Ninth tier of counties.....	Antrim.	Alpena.	44,715	2	.45	0	0
	Otsego.						
	Montmorency.						
Eighth tier of counties.....	Benzle.	Crawford.	68,430	4	.58	1	.15
	G'd. Traverse	Oscoda.					
	Kalkaska.	Alcona.					
Seventh tier of counties.....	Manistee.	Ogemaw.	161,297	55	3.41	2	.12
	Wexford.	Iscoco.					
	Missaukee.						
Sixth tier of counties.....	Roscommon.	Gladwin.	94,010	47	5.00	2	.21
	Mason.	Bay.					
	Lake.	Huron.					
Fifth tier of counties.....	Oscoda.	Arenac.	251,370	470	18.70	6	.24
	Clare.						
	Oceana.						
Fourth tier of counties.....	Newaygo.	Midland.	389,922	592	15.18	22	.56
	Mecosta.						
	Isabella.						
Third tier of counties.....	Muskegon.	Tuscola.	232,834	192	8.25	4	.17
	Montcalm.	Sauilac.					
	Gratiot.						
Second tier of counties.....	Saginaw.	Shiawassee.	525,805	764	14.53	31	.59
	Ottawa.	Genesee.					
	Kent.	Lapeer.					
First tier of counties.....	Ionia.	St. Clair.	232,233	253	10.89	1	.04
	Clinton.						
	Allegan.	Livingston.					
	Barry.	Oakland.	232,233	253	10.89	1	.04
	Eaton.	Macomb.					
	Ingham.						
	Van Buren.	Washtenaw.	232,233	253	10.89	1	.04
	Kalamazoo.	Wayne.					
	Calhoun.						
	Jackson.		232,233	253	10.89	1	.04
	Berrien.	Hillsdale.					
	Cass.	Lenawee.					
	St. Joseph.	Monroe.	232,233	253	10.89	1	.04
	Branch.						

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1891. Computed in the Office of the State Board of Health.

The sickness-rates and death-rates shown in the accompanying map (Plate 924) agree with those in Table 4, except that in some instances but one decimal place could be used on the map, while in the table the sickness and death-rates are carried out to the second decimal place.

Sickness-rates from Reported Scarlet Fever by Divisions and Counties.

Table 3 exhibits the latitudinal distribution of scarlet fever reported throughout the State, by tiers of counties; all the counties of the Upper Peninsula considered as one tier. By this table (3) it appears that the

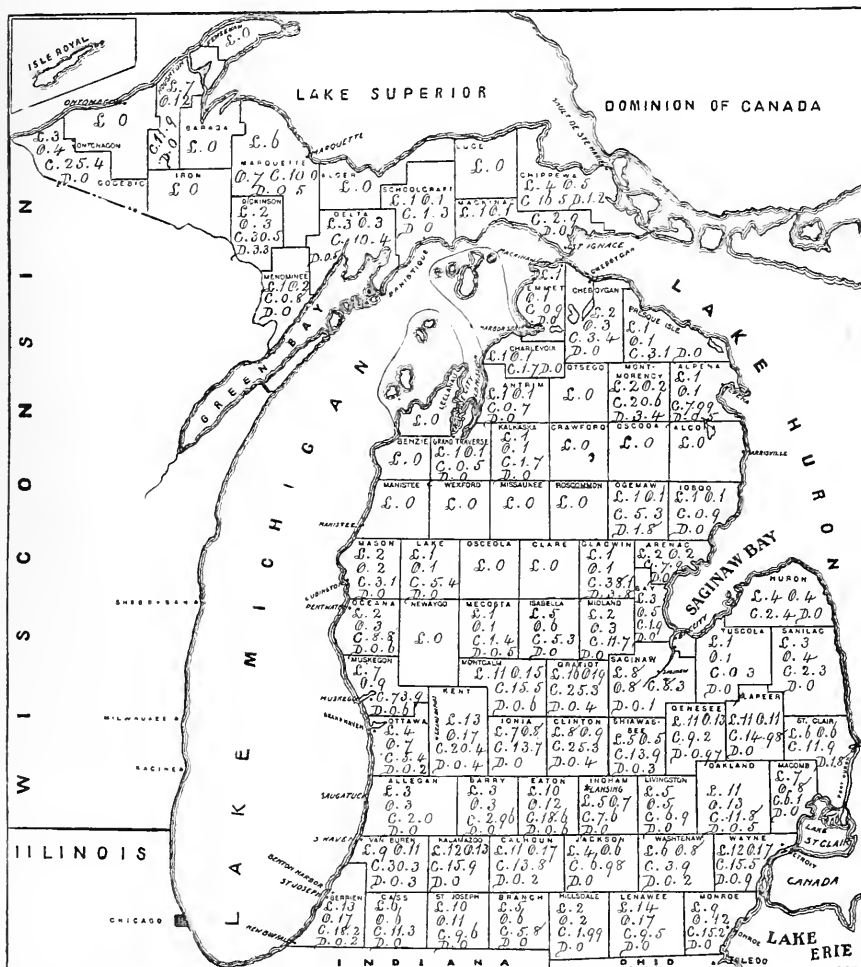
TABLE 4.—Numbers of Cases and Deaths reported from Scarlet Fever per 10,000 persons living in each county in Michigan during the year 1896. (Compiled from reports of health officers, clerks, etc.)

State and Counties.	Estimated Population for 1896.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated Population for 1896.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,315,517	2,646	81	11.43	.35	Keweenaw	2,693	0	0	0	0
						Lake	5,593	3	0	5.36	0
Alcona	5,423	0	0	0	0	Lapeer	28,712	43	0	14.98	0
Alger	1,459	0	0	0	0	Leelanau	10,281	0	0	0	0
Allegan	39,803	8	0	2.04	0	Lenawee	48,588	46	0	9.47	0
Alpena	18,785	15	1	7.99	.53	Livingston	20,227	14	0	6.92	0
Antrim	13,434	1	0	.74	0	Luce	2,294	0	0	0	0
Arenac	7,573	6	0	7.92	0	Mackinac	6,941	2	0	2.88	0
Baraga	4,830	0	0	0	0	Macomb	32,674	20	0	6.12	0
Barry	23,657	7	0	2.96	0	Manistee	27,056	0	0	0	0
Bay	63,750	12	0	1.88	0	Marquette	38,972	39	2	10.01	.51
Benzie	9,476	0	0	0	0	Mason	19,440	6	0	3.09	0
Berrien	47,810	87	1	18.20	.21	Mecosta	21,245	3	1	1.41	.47
Branch	25,913	15	0	5.79	0	Menominee	24,345	2	0	.82	0
Calhoun	49,458	68	1	13.75	.20	Midland	14,499	17	0	11.72	0
Cass	21,288	24	0	11.27	0	Missaukee	7,909	0	0	0	0
Charlevoix	11,702	2	0	1.71	0	Monroe	33,603	51	0	15.18	0
Cheboygan	14,857	5	0	3.37	0	Montcalm	34,919	54	2	15.46	.57
Chippewa	16,974	28	2	16.50	1.18	Montmorency	2,914	6	1	20.59	3.43
Clare	8,185	0	0	0	0	Muskegon	35,980	266	2	73.93	.56
Clinton	26,139	66	1	25.25	.38	Newaygo	18,449	0	0	0	0
Crawford	2,584	0	0	0	0	Oakland	43,392	51	2	11.75	.46
Delta	21,228	22	1	10.36	.47	Oceana	17,050	15	1	8.80	.59
Dickinson	15,074	46	5	30.52	3.32	Ogemaw	5,666	3	1	5.29	1.76
Eaton	32,880	61	2	18.55	.61	Ontonagon	8,432	0	0	0	0
Emmet	11,825	1	0	.85	0	Osceola	17,398	0	0	0	0
Genesee	41,115	38	4	9.24	.97	Oscoda	1,757	0	0	0	0
Gladwin	5,246	20	2	38.12	3.81	Otsego	5,055	0	0	0	0
Gogebic	14,542	37	0	25.44	0	Ottawa	40,946	22	1	5.37	.24
Gr'd Traverse	19,595	1	0	.51	0	Presque Isle	6,523	2	0	3.07	0
Gratiot	28,830	73	1	25.32	.35	Roscommon	1,469	0	0	0	0
Hillsdale	30,078	6	0	1.99	0	Saginaw	81,634	68	1	8.33	.12
Houghton	48,568	58	0	11.94	0	Sanilac	34,623	8	0	2.31	0
Huron	34,112	8	0	2.35	0	Schoolcraft	7,782	1	0	1.29	0
Ingham	40,701	31	0	7.62	0	Shiawassee	33,805	47	1	13.90	.30
Ionia	35,830	49	0	13.68	0	St. Clair	55,429	66	10	11.91	1.80
Iosco	10,898	1	0	.92	0	St. Joseph	24,953	24	0	9.62	0
Iron	5,427	0	0	0	0	Tuscola	35,364	1	0	.28	0
Isabella	22,767	12	0	5.27	0	Van Buren	31,318	95	1	30.33	.32
Jackson	47,287	33	0	6.98	0	Washtenaw	44,159	17	1	3.85	.23
Kalamazoo	43,448	69	0	15.88	0	Wayne	310,135	482	28	15.54	.90
Kalkaska	5,880	1	0	1.70	0	Wexford	15,432	0	0	0	0
Kent	127,946	261	5	20.40	.39						

* Population estimated by average annual increase, arithmetical method, based on U. S. Census of 1890 and the State Census of 1894; computed in the Office of the State Board of Health.

DISTRIBUTION OF SCARLET FEVER IN MICHIGAN IN 1896.

BY COUNTIES THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.



L. = Localities; O. = Outbreaks; C. = Cases per 10,000 population; D. = Deaths per 10,000 population.

[PLATE 924.]

greatest reported prevalence of scarlet fever was in the fifth tier, where the sickness-rate was 18.70 cases per 10,000 inhabitants. The fourth tier with 15.18, and the second tier, with 14.53 cases per 10,000 inhabitants, had the next highest sickness-rates. Notwithstanding the usual number of reports were received from the ninth and eighth tiers of counties, there were but two cases reported from the ninth tier and four cases and one death were reported from the eighth tier.—these tiers having a population of 44,715 and 68,430, respectively.

Table 4 shows the greatest sickness-rate, by counties, reported from this disease was in Muskegon county, where the ratio of cases to population was 73.93 per 10,000. This was more than double the sickness-rate of any county, except Gladwin, with 38.12 cases per 10,000 inhabitants. All but 37 of the 266 cases reported to have occurred in Muskegon county were reported in Muskegon city.

The lowest reported sickness-rate, by counties, for the year, .28 of one case per 10,000 inhabitants, was in Tuscola county. In 24 other counties where scarlet fever was reported, the sickness-rates were less than one-half the average sickness-rate for the State. Of these counties, Grand Traverse, with .51 of one case per 10,000 inhabitants, ranked lowest. From nineteen counties, all of which are above the fifth tier,—having an aggregate population of 155,609—no scarlet fever was reported during the year.

The sickness-rate in the second tier of counties, as may be seen in the table (3), was 14.53 cases per 10,000 inhabitants. In the city of Detroit, situated in this tier, the rate was 16.25, per 10,000 inhabitants, and in this tier, excluding Detroit, the rate was 12.64, per 10,000 inhabitants.* In the fourth tier of counties, in which is situated the city of Grand Rapids, the sickness-rate was 15.18, per 10,000 inhabitants. In the city of Grand Rapids the rate was 23.89 cases per 10,000 inhabitants, and in the tier of counties excluding Grand Rapids the rate was 12.57 cases per 10,000 inhabitants. In the years, 1894-95, the sickness-rates from scarlet fever in Detroit and Grand Rapids were lower than those for the tiers of counties in which they are situated, and lower than the average for the State. In 1896, the reverse of this is shown, the rates in these cities being much higher than in their tiers of counties, and in the State, and this, also, has been the experience of several years previous to 1894.

Death-rates from Reported Scarlet Fever by Divisions and Counties.

Table 3 shows that the greatest death-rate, by tiers of counties, from reported scarlet fever, .59 of one death per 10,000 inhabitants, was in the second tier. The fourth tier of counties, with .56 of one death per 10,000 inhabitants, having the next highest death-rate. No deaths were reported from the eleventh and ninth tiers. The lowest death-rate from reported scarlet fever, .04 of one death per 10,000 inhabitants, was in the first tier of counties. The seventh and eighth tiers, with .12 and .15, of one death per 10,000 inhabitants, having the next lowest death-rates.

Table 4 shows that the greatest death-rate, by counties, from reported scarlet fever, 3.81 deaths per 10,000 inhabitants, was in Gladwin county.

In 37 counties, from which an aggregate of 627 cases of scarlet fever were reported, there were no deaths reported from this disease. The lowest death-rate, by counties, from reported scarlet fever, .12 of one death per 10,000 inhabitants, was in Saginaw county.

Fatality from Reported Scarlet Fever, by Counties, in 1896.

The fatality from scarlet fever in 1896,—i. e., the proportion of reported cases which proved fatal, was, for the whole State, 3.1 per cent, or about one death to 32 cases. In Mecosta and Ogemaw counties the fatality was

* The Boards of Health of the cities of Detroit and Grand Rapids stated the population of these cities, in 1896, as 275,000 and 90,000 respectively. These numbers were used in making these calculations.

the same, 33.3 per cent of reported cases, which was the highest fatality. The next highest fatality, 16.7 per cent of reported cases, was in Montmorency county. The minimum fatality, in counties from which deaths were reported, .8 of one per cent of reported cases, occurred in Muskegon county. This county, as previously shown, had the highest sickness-rate.

EXHIBIT I.—*Exhibiting the numbers of outbreaks and cases of and deaths from scarlet fever which occurred in the cities, villages, and townships of Michigan in 1896, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages, and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Classes of Political Divisions and Numbers of each class of Divisions.	Popula- tion.*	Health jurisdictions.	Outbreaks in :			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 10,000 Population.	
			Localities.						Cases.	Deaths.
			No. of	Per cent of all local- ities.						
State (83 counties)	2,315,517	1,592	332	21	406	2,646	81	3	11.43	.35
Cities (77).....	885,388	78	55	71	82	1,475	57	4	16.66	.64
Villages (298)	246,869	298	60	20	72	300	2	1	12.15	.08
Townships (1,216)	1,183,260	1,216	217	18	252	871	22	3	7.36	.19

From the data in the above table it may be observed that 71 per cent of the cities, 20 per cent of the villages, and 18 per cent of the townships were infected with scarlet fever. But the average population of the cities is nearly fourteen times the average population of the villages.† The highest case-rate (16.66) and death-rate (.64) occurred in the cities; the lowest case-rate (7.36) occurred in the townships, and the death-rates in the villages and townships were .08 and .19, respectively. The highest fatality (4 per cent) occurred in the cities, and the lowest (1 per cent) occurred in the villages.

Scarlet Fever in Each Month of the Year, 1896.

TABLE 5.—*Exhibiting the reported number of outbreaks of Scarlet Fever which Began, the number which Ended, and the number which were Present, in each Month of the Year 1896, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept	Oct.	Nov	Dec.	Year.
Number began	48	37	31	30	37	17	21	23	22	36	30	45	377
Number ended	31	18	31	35	40	26	18	15	14	26	26	45	325
Number present . . .	88	89	94	93	91	65	59	61	66	83	84	99	-----

* Estimated by arithmetical method in the Office of the State Board of Health.

† The average population of the cities is 11,459, of the villages, 828, and of the townships, 973.

The last line of figures in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 52 more beginnings than endings of outbreaks reported during the year 1896.

TABLE 6.—*Exhibiting the Number and Per Cent of Localities infected with Scarlet Fever and the Number and Per Cent of Cases of Scarlet Fever in Michigan in each Month during the Year 1896. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Localities, number.....	86	89	93	92	91	65	58	60	66	82	83	99
Per cent.....	26	27	28	28	27	20	17	18	20	25	25	30
Cases present, number.....	238	268	286	313	312	361	225	171	224	279	290	368
Per cent.....	9	10	10	11	11	13	8	6	8	10	11	13

The third line of figures, in Table 6, shows the number of cases reported sick in any part of each month.

As some of the cases were sick longer than one month they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1896; and the sum of the last line of figures in Table 6 exceeds 100.

The second and last lines of figures, in this table, show the per cent the localities infected, and the cases sick, in each month are of the exact number of localities and cases *reported* to this office for the year 1896.

Source of Contagium of Scarlet Fever, How the Disease is Spread, and the Vitality of the Contagium.

Of the 2,646 cases of scarlet fever reported during the year 1896, as exhibited in the following table, the local health officers reported the source of contagium, as follows: Traced to a former case, 503; probably traced to a former case, 28; attributed to infected houses, articles, clothing, etc., 26; source of contagium unknown, 1,137; source of contagium not stated, 889; traced to an outside jurisdiction, 46; probably from an outside jurisdiction, 17.

TABLE 7.—*Reported Source of Contagium of Cases of Scarlet Fever, in 1896.*

	Cases.
Traced to a former case	503
Probably traced to a former case	28
Attributed to infected houses, articles, clothing, etc.	26
Source of contagium unknown, or reports not definite (including "Exposure," "Contagium," "Endemic" and "Sporadic")	1,137
Source of contagium not stated	359
Traced to outside jurisdictions	46
Probably from an outside jurisdiction	17
All cases	2,646

Cases of Scarlet Fever Traced to a Former Case.

Table 7 shows that of the 2,646 reported cases of scarlet fever in this State in 1896, 503 were reported traced to a former case of the disease. The following extracts are from a few of the health officers' reports in which the cases were traced to a former case in the same jurisdiction:

"From her sisters."—*Wm. D. Johnstone, Flint township, Genesee county.*

"Her little sister would steal into the room, and contracted the disease."—*Walter C. Snyder, M. D., Hanover township, Jackson county.*

"Not isolated—house too small,"—*B. M. Thomas, Kalamazoo township, Kalamazoo county.*

"First two cases not recognized till they were about, one at school and the other at Sunday school."—*Geo. B. Hammond, M. D., Royal Oak village, Oakland county.*

"One story, small house, and could not isolate them from the other members of the family."—*Wm. F. Reus, M. D., Grand Haven city, Ottawa county.*

"Children had chicken-pox and no physician was called, till I heard rumor that more than chicken-pox existed, when I investigated and found the two elder children scaling freely and the third with a typical mild scarlet fever."—*H. M. Ptolemy, M. D., Brighton village, Livingston county.*

Source of Scarlet Fever Unknown or Reports Indefinite.

The following extracts are taken from a few of the health officers' reports in which the source of contagium of cases was reported as unknown, or reports were not definite:—

"Don't know, unless caught on the cars."—*Geo. G. Barnett, M. D., Ishpeming city, Marquette county.*

"Sporadic cases."—*E. G. Folsom, M. D., Mt. Clemens city, Macomb county.*

"Contagion."—*S. A. Snow, M. D., North Branch village, Lapeer county.*

"There is nothing certain about the source of contagium."—*Sam'l Stevenson, M. D., Morency village, Lenawee county.*

"Cold."—*Thos. W. Kirby, M. D., Pickford township, Chippewa county.*

Duration of the Vitality of the Scarlet Fever Germ.

The germ of scarlet fever is not yet demonstrated; but that there is a germ seems to be proved by the known communicability of the disease.

The following extracts from the reports of health officers and physicians indicate that the scarlet fever germ frequently retains its vitality

for a long time outside of the human body, in an apparently dormant or inactive state, in houses, clothing, carpets, furniture, etc., and is then capable of developing scarlet fever in persons coming into such houses or in contact with or near such articles, thus showing the importance of carefully disinfecting all infected houses and articles, even where they are not to be used for a long time:—

"By a cloak worn by a child who had this two years since, which came from Cass county."—*C. E. Barninger, M. D., Park township, St. Joseph county.*

"From an old velvet covered stand the child had in playhouse and ripped the velvet off the stand. Was originally the property of another family that had scarlet fever five years ago."—*J. W. Ewing, Oneida township, Eaton county.*

"One case in house where a case occurred last winter."—*Theodore Cole, M. D., Lansing city, Ingham county.*

"I think that the disease was contracted from infectious material left in the house by former tenants that occupied the place three years ago. The premises were not disinfected after the outbreak three years ago."—*E. J. C. Ellis, M. D., Hudson township, Lenawee county.*

"Possibly from books used from a house where it had been six months previously."—*O. M. Layton, M. D., Mellen township, Menominee county.*

"Supposed to have been contracted at her grandparents' home where her mother had scarlet fever some eight years ago. Child was taken there."—*Robt. Johnston, M. D., Milford township, Oakland county.*

"A possible source was the fact that the patient sat in a chair on which was a lady's cloak from a house where there had been a case of scarlet fever four months previous."—*W. K. West, M. D., Lake Linden village, Houghton county.*

"Supposed to be old clothes which had not been thoroughly disinfected after scarlet fever in the family five years ago."—*A. T. Parrish, M. D., Burns township, Shiawassee county.*

In addition to the extracts given above the following extracts are from health officers' reports in which the contagium is traced to infected clothing, houses, etc.:—

"Infection being carried in a carpet woven by a lady who had cared for some scarlet fever patients."—*F. L. Hoffman, M. D., Le Roy township, Calhoun county.*

"Contagium carried in clothes from some of the neighbors."—*C. F. Patton, M. D., Elba township, Gratiot county.*

"In the first house were some dolls that though disinfected thoroughly as possible, carried to second."—*A. Price, M. D., Almont township, Lapeer county.*

"Infected clothing received from a relative who died in Colorado of scarlet fever."—*J. J. Kittredge, M. D., Crystal township, Oceana county.*

"Second case received a letter from a friend in Montague four or five weeks before coming down with scarlet fever. This friend was in the active stage of peeling when writing the letter."—*W. P. Gamber, M. D., Stanton City, Montcalm county.*

Movements of Contagium of Scarlet Fever.

The following Table (S) and Map, "Movements of Contagium," show the sources and direction of movements of scarlet fever in Michigan, where the contagium was reported by health officers to have been introduced into their jurisdictions from localities outside the State, or from other jurisdictions within the State.

On the Map, the spread of scarlet fever in Michigan as reported to this Office in the year, 1896, is shown by black lines which connect the localities; the arrow-head indicates the direction of the movement in each case.

TABLE 8.—*First, second and third localities, where the second locality was infected with Scarlet Fever from the first, and the third was infected from the second; and the numbers of cases and deaths from Scarlet Fever in the first, second and third localities, with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Alpena county: Alpena city (Oct. 18-Feb. 20, 1897.)	24	1	Montmorency county: Rust township	5	1			
Barry county: Woodland village	*	---	Barry county: Woodland township .. (Oct.-Nov.)	4	1			
Berrien county: Lake township	24	0	Berrien county: Weesaw township	4	0			
Berrien county: Weesaw township	2	0	Berrien county: Buchanan village	1	0			
Calhoun county: Battle Creek township..	*	---	Calhoun county: Le Roy township	3	0			
Cass county: Cassopolis village	6	0	Cass county: La Grange township ..	4	0			
Cass county			St. Joseph county: Park township	1	0			
Clinton county: Essex township	*	---	Clinton county: Lebanon township	1	0			
Emmet county: Readmond township ...	*	---	Emmet county: Cross village Tp.	1	0			
Genesee county: Flint city	5	0	Genesee county: Grand Blanc township	2	2			
Gratiot county: Alma village	*	---	Houghton county: Laird township	1	0			
Gratiot county: Elba township	5	0	Gratiot county: St. Louis city	2	0	{ Gratiot county: Hamilton township† (— July 10.)	11	1
Gratiot county: Perrinton village	*	---	Gratiot county: Ithaca village	1	0			
			Gratiot county: Ithaca township	4	0	{ Midland county: Jasper township	1	0
			Gratiot county: Isabella county: Fremont township	3	0			

* Scarlet Fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

† From Hamilton Tp. to Ashley Vil., Gratiot Co., 4 cases. From Hamilton Tp. to Lafayette Tp., Gratiot Co., 1 case.

TABLE 8.—CONTINUED.—*Movement of Infection of Scarlet Fever.*

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Hillsdale county.....	—	—	Lenawee county: Blissfield village (Jan. 16-Feb. 15).....	2	0			
Houghton county: Calumet township..... (Jan. 4-Dec.).....	28	0	Houghton county: Chassell township (Oct. 24-Nov.).....	1	0			
Houghton county: Houghton village.....	*	—	Houghton county: Chassell township (Oct. 24-Nov. 20).....	2	0			
Huron county: Gore township.....	*	—	Huron county: Sand Beach village (May 16-June 12.).....	4	0			
Ingham county: Lansing city..... (Feb.-June, 1897.).....	24	0	Genesee county; Flint township..... (Apr. 18-May 23.).....	4	0			
Ingham county: Mason city.....	*	—	Eaton county: Pottersville village (Jan. 27-Mar. 10).....	6	0			
Ingham township: White Oak township	*	—	Livingston county: Marion township..... (Dec. 27 —.).....	2	0			
Ionia county: Belding city..... (Jan.-Jan. 4, 1897).....	37	0	Ionia county: Orisco township..... (Feb. 1-Mar. 20.).....	1	0			
Ionia county: Berlin township.....	*	—	Ionia county: Saranac village..... (Dec. 10 —.).....	1	0	Barry county: Hastings city.....	2	0
Isabella county: Fremont township..... (Nov. 8-Nov. 22.).....	3	0	Gratiot county: Seville township..... (Dec. 24-Jan. 8, 1897.).....	1	0			
Isabella county: Mt. Pleasant city..... (May 31-June 10.).....	1	0	Houghton county: Laird township..... (July 27-Aug. 19.).....	3	0			
Kalamazoo county: Kalamazoo city..... (Jan. 13-Mar. 1, 1897).....	23	0	Kalamazoo county: Oshtemo township..... (Feb. 2-May 25).....	4	0			
Kalamazoo county: Pavilion township..... (Nov.-Jan., 1897.).....	11	0	Kalamazoo county: Charleston township... (Dec. 10-Jan., 1897.).....	1	0			
Kent county: Grand Rapids city..... (Jan. 1 —.).....	215	4	Kent county: Solon township..... (Aug.-Sept. 20).....	3	0			
Lapeer county: Hadley township..... (Dec. 1-Jan. 20, 1897.).....	2	0	Lapeer county: Hadley village..... (Dec. 4 Jan., 1897.).....	5	0			
Livingston county; Howell village..... (Apr. 22-June 15).....	6	0	Livingston county: Coboctah township.... (Apr.-May.).....	1	0			
Montcalm county: Ferris township.....	*	—	Montcalm county: Stanton city..... (Mar. 2-Mar. 20.).....	4	0			
Montcalm county: Sheridan village.....	12	0	Montcalm county: Stanton city..... (Oct. 18-Nov. 15.).....	1	0			

* This foot-note is printed at the bottom of the first page.

TABLE 8.—CONTINUED.—*Movement of Infection of Scarlet Fever.*

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Muskegon county: Montague village	*	---	Montcalm county: Stanton city..... (Dec. 17-Jan. 14, '97.)	1	0			
			{ Kent county: Algoma township..... (Aug. 15-Sept. 15.)	6	0			
Muskegon county: Muskegon city..... (Jan.-Dec. 31.)	229	2	{ Lake county: Elk township..... (Aug. 21-Sept. 7.)	3	0			
			{ Muskegon county: Laketon township (Mar. 12-Apr. 16.)	9	0			
			{ Muskegon township .. (Apr. 7—.)	3	0			
Oakland county: Orchard Lake	*	---	Gratiot county: Sumner township..... (Feb. 6-Feb. 15.)	1	0	Gratiot county: Arcada township (Feb. 22-Mar. 10)	1	0
Oakland county: Waterford township..... (Oct. 3-Feb. 18, 1897.)	17	0	Oakland county: Milford township (— Nov. 4)	2	0			
Saginaw county: Saginaw city..... (Feb. 11-Dec. 30.)	53	0	Bay county: Bay City..... (July 13-Dec. 16.)	6	0			
Shiawassee county: Owosso city..... (Jan. 5-Mar., 1897.)	39	0	Ingham county: Meridian township. . (Dec. 26-Jan. 18, '97.)	6	0			
St. Clair county: Marine City..... (Jan.-July 3.)	16	4	St. Clair county: Cottrellville township (Jan.-Mar. 1.)	3	0			
St. Clair county: Mussey township..... (Jan.-Feb.)	1	0	St. Clair county: Capac village	11	0			
St. Joseph county: Burr Oak township.....	*	---	St. Joseph county: Colon township..... (May 21-June 6.)	2	0			
Van Buren county: Hartford village.....	*	---	Van Buren county: Keeler township..... (Feb. 27-Mar. 15.)	2	0			
Washtenaw county: Manchester village..... (Aug. 28-Sept. 22.)	2	0	Lenawee county: Clinton village..... (Dec. 17-Jan. 27, '97.)	3	0			
Washtenaw county: Ypsilanti city..... (Feb. —.)	1	0	Lenawee county: Franklin township.... (Feb. 22-Mar. 5)	1	0			
Washtenaw county.....		---	Eaton county: Kalama township..... (Mar. 19-Apr. 11)	3	0			
Wayne county: Detroit city..... (Jan. 1-Dec. 31.)	447	25	{ Oakland county: Pontiac city..... (Jan. 6-Jan. 23)	1	0			
			{ Royal Oak township.. (Nov. 22-Dec. 8)	5	2			
			{ Wayne county: Greenfield township .. (Mar. 1-Apr. 6.)	4	0			
			{ Hamtramck township (Apr. 19-May 1.)	2	0			

* This foot-note is printed at the bottom of the first page.

TABLE 8.—CONTINUED.—*Movement of Infection of Scarlet Fever.*

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Wayne county: Van Buren township.....	*	----	Wayne county: Springwells township. (July 28-Aug. 11.)	1	0			
Movement of Infection of Scarlet Fever into Michigan from outside the State.								
Chicago.....			Berrien county: Watervliet township.. (Oct. 27 —.)	6	0			
			Eaton county: Charlotte city..... (Mar. —.)	3	1			
			Lapeer county: Almont township..... (Jan.-Mar. 14)	3	0			
			St. Joseph county: Mottville township ... (Oct.-Nov)	1	0			
Colorado.....			Oceana county: Crystal township..... (Sept. 9-Oct. 30)	12	1			
Indiana.....			Berrien county: Niles city..... (Sept. 1-Jan. 20, '97.)	1	0			
Ohio: Lorain.....			Macomb county: Fraser village..... (Aug. —.)	1	0			
Ohio: Toledo.....			Monroe county: Whiteford township .. (July 7-Aug. 20.)	4	0			
Wisconsin: Milwaukee city.....			Gogebic county: Ironwood city..... (Nov. 7-Dec. 5)	2	0			
Probable Movement of Infection of Scarlet Fever.								
Clinton county: St. Johns village..... (Jan. 5-July.)	35	1	Clinton county: Greenbush township.. (May 1-June.)	8	0			
Dickinson county: Iron Mountain city..... (Feb. 1-Apr. 13.)	30	2	Dickinson county: Norway city..... (Mar. 20-Apr. 25.)	3	0			
Ionia county: Belding city..... (Jan., '96-Jan. 4, '97.)	37	0	Montcalm county: Belvidere township ... (Nov. 8-Dec. 20)	3	1			
Ionia county: Saranac village.....	1	0	Ionia county: Ionia township.....	4	0			
Jackson county: Hanover township..... (Feb. 19 May 13.)	8	0	Jackson county: Liberty township (May 5-May 25.)	1	0			
Kalamazoo county: Kalamazoo city..... (Jan., '96-Mar. 1, '97.)	23	0	Van Buren county: Antwerp township.... (Jan.-Jan. 25.)	1	0			

* This foot-note is printed at the bottom of the first page.

TABLE 8.—CONCLUDED.—Probable Movement of Infection.

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Kent county: Grand Rapids..... (Jan. 1-Dec. 31.)	215	4	{ Kent county: Cascade township ---- (Nov. 21-Dec. 8.)	1	0			
			{ Mecosta county: Hinton township..... (Nov. 15-Dec. 23.)	3	1			
Lenawee county: Seneca township..... (Jan. 28—.)	1	0	{ Lenawee county: Fairfield township....	1	0			
Moncalm county: Sidney township..... (Jan. 14-May 10.)	9	0	{ Montcalm county: Fair Plains township. (Apr.-May.)	5	0			
			{ Sheridan village ---- (Mar.-Mar.)	12	0			
Muskegon county: Muskegon city..... (Jan. 11-Dec. 31.)	229	2	{ Montcalm county: Lakeview village..... (May 14-June 25.)	5	0			
			{ Muskegon county: Dalton township..... (Aug. 23-Sept. 17.)	2	0			
Oakland county: Lyons township.....	*	---	{ Oakland county: Milford township..... (Jan. 8-May 11.)	2	0			
Oceana county: Ferry township.....	*	---	{ Oceana county: Shelby village..... (Dec. 22-Jan. 5, '97.)	1	0			
Wayne county: Detroit city..... (Jan. 1-Dec. 31.)	447	25	{ Oakland county: Royal Oak village --- (Jan. 23-Apr. 22.)	17	0			
			{ Troy township ---- (July 22-Aug. 5.)	1	0			
Probable Movement of Infection into Michigan from outside the State.								
Chicago		---	{ Van Buren county: South Haven village.. (Jan.-July)	32	1	{ Van Buren county: Geneva township..... (Jan. 13-Dec. 15.)	48	0
Indiana: Kendallville		---	{ St. Joseph county: White Pigeon village.. (Nov. 29-Dec. 30.)	1	0			
Ohio: Toledo.....		---	{ Monroe county: Bedford township..... (Nov. 8-Dec. 20.)	3	0			

* This foot-note is printed at the bottom of the first page.

MOVEMENTS OF CONTAGIUM OF SCARLET FEVER IN MICHIGAN IN 1896.



THIS MAP ILLUSTRATES TABLE B. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS.

[PLATE 920]

————— DEFINITELY TRACED. PROBABLY TRACED.

NEGLECT OF MEASURES TO RESTRICT SCARLET FEVER, VIOLATION OF PUBLIC HEALTH LAWS, ETC.

Outbreak of Scarlet Fever in Niles City, Berrien County.

In regard to a neglected outbreak of scarlet fever in the city of Niles, Berrien county, the health officer, Dr. Wm. T. Dougan, reported that, probably but two of the thirty cases were isolated, a funeral of a scarlet fever patient was public and held in a church, and he traced most of the cases to this exposure, also, that children were sent to school and the families and patients were at large.

Further information in regard to this outbreak is given in the article, in this Report, relative to diphtheria.

Scarlet Fever in Muskegon City and Township.

There were 229 cases of scarlet fever and 2 deaths from this disease reported by the health officer, Dr. Paul A. Quick, to have occurred in the city of Muskegon during the year 1896. Dr. Quick stated in a final report, that he did not know in regard to the methods of disinfection and isolation.

April 25, 1896, Dr. Quick wrote to Secretary Baker as follows:—

"Please give me the following information: Has any family any right to allow their children to play upon the streets or in their own yard which borders on a public sidewalk where there is one member of the family sick with scarlet fever? How long must children be kept in where there has been a case of scarlet fever? Has any man any right to handle and peddle milk after caring for his family sick with scarlet fever? The case is this: A certain milk peddler has a family sick with scarlet fever, and after taking care of his children nights he milks his own cows and peddles the milk. Several of his customers are soon taken sick with scarlet fever. This man lives just outside of the city limits. His attending physician telling him he has a perfect right to do the same. His attending physician did not report the cases to any one, claiming they were outside of the city and he was not obliged to report them. The above is a correct statement of the case, and I, as health officer of this city, would like very much to know my duty in the matter. I have ordered the milk dealer to not peddle any more milk, and *placarded* his house. Did I have a right to do this, he being outside the city? Please give me an early opinion and oblige."

Secretary Baker wrote, April 28, in reply to Dr. Quick's letter:—

"Replying to your question of April 25,—

"1. The law (Act 137, laws of 1883) provides that infected persons shall be isolated from the public. Children from an infected house are dangerous, unless thoroughly disinfected before coming in contact with other persons and children. Perhaps the well children could be thoroughly disinfected and kept isolated and away from the child sick? Act 15, laws of 1893, provides punishment for any person willfully or knowingly exposing another person to the contagion of scarlet fever.

"2. Children from a house in which scarlet fever exists are dangerous so long as they are infected. They should undergo thorough disinfection before mingling with the public. Disinfection of the hair is important.

"3. Regarding the milk coming from a family in which there is a case of scarlet fever, if such milkman is not thoroughly isolated and has not had his clothes, hair, beard, etc., disinfected, he would be dangerous. I have written the health officer of Muskegon township that you did right in prohibiting such a milkman from peddling milk so long as there was danger of spreading the disease. I recommended that the milkman sleep in the barn and keep away from his house until such danger had passed; and, that after disinfection (thorough) he would probably be no menace to the life and health of others. But I think he should not be permitted to peddle milk until both he and the cows are kept at other premises than those where the scarlet fever is present.

"4. I have suggested to C. I. Giles that the physician who did not report the case of scarlet fever to him in accordance with the law should be proceeded against as violating section 1676 Howell's Statutes, and pointed out to him that it was his duty to make the complaint to the prosecuting attorney.

"5. I do not think that you have a right to placard a house outside your jurisdiction, that is the duty of the health officer of such a jurisdiction. You should report the case to him, and see that it is done. If the health officer does not comply with the law he is liable."

April 24, 1896, Chas. I. Giles, health officer of Muskegon township, wrote the following letter to Secretary Baker:—

"There were today reported to me three cases of scarlet fever as follows: * * * The father is a milkman selling milk in Muskegon. The city health officer heard of the cases and quarantined them, forbid Mr. B— from selling or allowing his milk to be sold in town, as well as eggs or any other product.

The house is out by itself a half mile from any other, the barn twenty rods from the house, and the cattle running out day times in the woods clear away from any house. The city health officer did not report same to me, nor would he assist them to anything to live on. He cut off all their resources for the man is entirely dependent on the product of his cows and chickens. He is on a rented place and all he owns is his cows. In this case whose place is it to look after his wants, and is it not the duty of the city health officer when he quarantines a case to look after it?

"Please advise me at an early date as it is not clear to me just what to do in this case. I cannot see why if those cows were handled by some one outside of the family it would not be all right to continue running the wagon and thus pay their own expenses at least. It is almost a certainty that the disease was carried to the family from the city."

In replying to this letter from Mr. Giles, Secretary Baker wrote:—

"Replying to your letter of April 24, relative to scarlet fever in your township, you are the health officer, and it is your duty under the law (Act 137, laws of 1883) to act promptly for the restriction of the disease, and see that those sick do not suffer for want of nurses or other assistance and necessities because of isolation for the public good. The health officer of Muskegon did right in forbidding Mr. B— coming to Muskegon or selling any milk in Muskegon city; it was your duty to order Mr. B— isolated as long as there was danger of his conveying the disease. However, if proper precautions are taken, I think it could perhaps be made safe for him to sell milk and eggs. His clothing, hair, beard, etc., should be thoroughly disinfected, and then he should not be permitted to go near the infected house. He might sleep in the barn and get his meals elsewhere, or cook them himself. But it would be best that both he and the animals should go to other premises not infected, if milk and eggs are to be sold.

"P. S. It is your duty to give the Prosecuting Attorney written notice of the names and dates of the violation of the law by the doctor who treated the child for scarlet fever in your township and did not report the fact to you at once."

The following letter, dated May 1, from the physician who failed to report these cases was received at this office:—

"I write you regarding the case reported by Dr. Quick of our city.

"I have had no intention of disobeying any of the laws of your board, and have always reported all cases promptly to his office.

"I was tardy in reporting the case in question for the reason that I had the impression that the law referred to corporate communities and not to isolated farm houses.

"I find that other reputable physicians of our city have the same idea regarding reports of cases not within the limits of our city.

* * * * *

"I trust that you will not insist on prosecution of my case as my motives are to obey the laws, both in letter and spirit."

A letter from Mr. Giles, dated May 2, stated, that he had taken charge of Mr. B—'s cows, had removed the wagon and milk utensils from the farm, had disinfected them, and engaged a man to run the business for Mr. B—'s benefit. And that Mr. B— and family were isolated.

Outbreaks of Scarlet Fever in Ithaca Village, Gratiot County.

There were three outbreaks of scarlet fever reported in Ithaca village, during the year, by the health officer, G. A. Ligiman. The first outbreak, in which there were six cases, occurred from May to August. Measures of restriction were reported only in regard to one case. This patient was not isolated, but disinfection was reported as thoroughly done.

The second outbreak was limited to one case, which was reported as traced to Perrinton: "Was brought from Perrinton by visiting people." Isolation and disinfection were carried out in this case.

The third outbreak was reported to have commenced, Dec. 10, 1896, and the last case reported was in July, 1897. There were 34 cases and 1 death reported. Health Officer Ligiman sent in a final report of 18 of these cases in which he stated that all except the first two cases were isolated. All were traced to a former case. In answer to the question in regard to the mode of introduction into the jurisdiction, he reported: "Came from a mild case, no doctor called, no notice given." These 18 cases he reported were thoroughly disinfected. No final report was received in reference to the remaining 16 cases reported. Inquiry was sent from this Office in regard to these cases, and the clerk of the village replied that Mr. Ligiman had died, and no records could be found.

Outbreak of Scarlet Fever in Geneva Township, Van Buren County.

During an outbreak of scarlet fever in Geneva township, Van Buren county, the health officer, N. S. Taylor, reported as follows:—

"Children smoldered and peered in school for some two weeks. Parents did not know what it was. * * * All but two cases very light. Disinfected ten houses, burned 103 pounds of sulphur. Some houses, burned 14 pounds, room 12x16,—did not kill flies on window. Some were log houses and very open; 100 pounds sulphur would do no good. Small houses, no room to isolate."

Dr. F. J. Wildanger, health officer of South Haven village, made complaint to this office regarding Health Officer Taylor's method of disinfection, and the village of South Haven quarantined against infected families in Geneva township. Considerable correspondence was received at this office relating to the dissatisfaction existing between these local health officers. The outbreak in Geneva township resulted in 48 cases.

OUTBREAKS OF SCARLET FEVER IN WHICH ISOLATION AND DISINFECTION WERE ENFORCED.

The following is the substance of a few health officers' statements which are representative of the statements of those health officers whose reports indicated that they had quite carefully enforced isolation and disinfection:—

In regard to measures used in restricting a case of scarlet fever in Fairfield township, Lenawee county, the health officer, Dr. Amos S. Youngs, reported, in substance, as follows:—

The patient was placed in a bedroom and the door closed, with a damp disinfected sheet hanging outside of the door. The room was sprayed with an antiseptic every half hour; and none but the nurses and physician were allowed to enter. The discharges of the patient were disinfected with a chlorinated lime solution and carbolic acid and buried. After the patient recovered all infected bedding, clothing, etc., was disinfected by boiling in zinc solution and by thorough fumigation, and all the rooms of the house were disinfected with fumes of burning sulphur at the rate of three pounds per 1,000 cubic feet of air space.

Concerning restrictive measures used in an outbreak of two cases of scarlet fever, in one household, in the village of Wakefield, Gogebic county, the health officer, Jno. La Salle, reported, substantially, as follows:—

Both patients were isolated from all except nurse and physician. The discharges of the patient were disinfected with zinc solution and buried 500 feet from any house. The privy was disinfected with fumes of burning sulphur and chloride of lime was used in the vault. After the patient recovered all

infected bedding, clothing, etc., were disinfected by washing in zinc solution or by exposing to fumes of burning sulphur, and all the rooms of the house were disinfected with fumes of burning sulphur at the rate of three pounds per 1,000 cubic feet of air space.

An outbreak of scarlet fever in Martin township, Allegan county, was restricted to one case in a family of five children. The health officer, Dr. J. A. Heasley, reported in regard to the restrictive measures used in this case, in substance, as follows:—

The patient was placed in a separate room and only the nurse and physician were allowed to see her. The discharges of the patient were disinfected with chloride of lime. All infected bedding, clothing, etc., were disinfected with fumes of burning sulphur and by washing. After the patient recovered all the rooms of the house were disinfected with fumes of burning sulphur, but he did not know the amount of sulphur burned.

ESTIMATED NUMBER OF CASES OF SCARLET FEVER PREVENTED, AND NUMBER OF LIVES SAVED, BY ISOLATION AND DISINFECTION.

Tables 9 and 10 and the following diagram compare the average numbers of cases and deaths in outbreaks of scarlet fever where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where those measures were neglected.* By Table 10 it may be seen that during the ten years, 1887-96, there were over five times as many cases and deaths in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 9 it may be seen that during the year 1896 there were reported to the office of the State Board of Health 389 outbreaks of scarlet fever, with 1,534 cases and 42 deaths.† Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 3,310 cases and 78 deaths, and taking from these respectively the cases (1,534) and deaths (42) which did occur, leaves 1,776 cases and 36 deaths indicated as prevented in these 389 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 5,030 outbreaks which occurred during the ten years, 1887-96, is 31,298 cases and 1,022 lives. This is shown in Table 10.

* In the compilation of the reports for Tables 9 and 10 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

† *Definition of Outbreak*.—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed, at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

TABLE 9.—Scarlet Fever in Michigan in 1896: Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 389 outbreaks reported; (2) in the 148 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 7 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 22 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 23 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 31 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 80 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 78 outbreaks in which Isolation and Disinfection were both enforced.

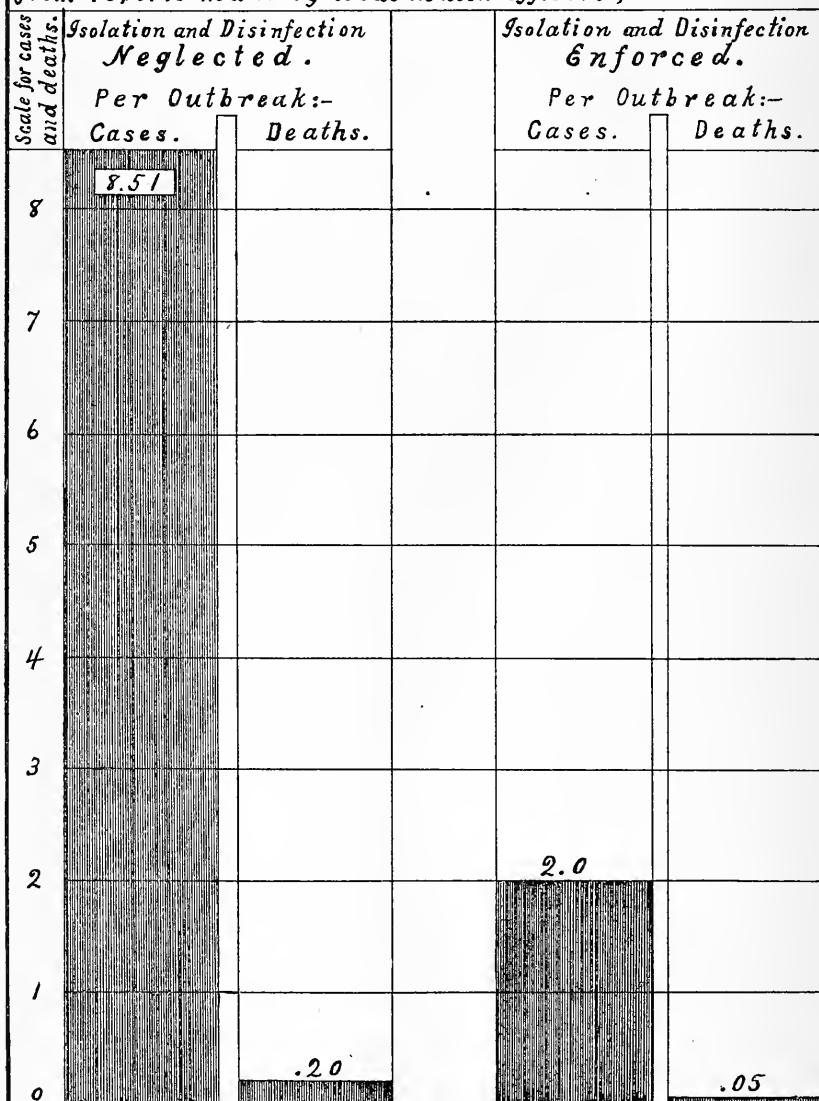
	(1) All outbreaks, (389 outbreaks,*)		(2) Isolation or Disinfection or both not mentioned, or statements doubtful, (148 outbreaks,)		(3) Disinfection enforced—Isolation doubtful, (7 outbreaks,)		(4) Isolation enforced—Disinfection doubtful, (22 outbreaks,)		(5) Disinfection enforced—Isolation neglected, (23 outbreaks,)		(6) Isolation enforced—Disinfection neglected, (31 outbreaks,)		(7) Isolation and Disinfection both neglected, (80 outbreaks,)		(8) Isolation and Disinfection both enforced, (78 outbreaks,)	
	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,
Totals.....	1,534	42	485	15	10	0	41	3	99	4	65	0	681	16	153	4
Averages -	3.94	.11	3.28	.10	1.43	0	1.86	.14	4.30	.17	2.10	0	†8.51	†.20	†2.00	†.05

* These do not include the cases and deaths in Detroit, Grand Rapids, Lansing, Saginaw, E. S., Port Huron, Kalamazoo, Muskegon, and Calumet Tps., because of the difficulty in determining the beginning and ending of an outbreak in these cities, or township in which the disease was present in some part of the city or township nearly all the time.

† These figures are graphically represented in the diagram opposite this page, entitled "Isolation and Disinfection restricted Scarlet Fever in Michigan in 1896."

ISOLATION AND DISINFECTION RESTRICT SCARLET FEVER.

Scarlet Fever in Michigan in 1896:—Exhibiting the average numbers of cases and deaths per outbreak:—in all outbreaks in which Isolation and Disinfection were both Neglected: and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)



This diagram graphically represents the lower line of figures in the last four columns of Table 9:

TABLE 10.—SCARLET FEVER.—Exhibiting for the ten years, and for each of the ten years 1887-96, the numbers of Reported Outbreaks, Cases and Deaths; also for this ten-year period, the average numbers of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection or both were Doubtful; Isolation and Disinfection both Neglected; Isolation and Disinfection both Enforced; and, also, the numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.

Years.	*All Outbreaks.			Isolation or Disinfection, or both, not Mentioned, or Statements Doubtful.			Isolation and Disinfection both Neglected.			Isolation and Disinfection both Enforced.			Cases and Deaths Indicated as having been Prevented by Isolation and Disinfection.	
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Case.	Deaths.
1887.....	299	1,882	141	190	1,200	93	32	440	34	64	148	11	2,220	177
1888.....	340	1,838	112	225	955	74	61	724	33	36	80	3	2,198	72
1889.....	417	2,822	123	284	1,453	61	72	1,208	48	52	140	10	4,175	156
1890.....	477	3,054	115	302	1,711	67	94	1,137	36	42	76	1	2,718	66
1891.....	602	4,936	193	380	3,012	91	141	1,704	66	42	107	1	2,342	90
1892.....	622	5,240	306	377	2,944	138	110	1,621	59	42	97	7	3,928	30
1893.....	667	5,219	327	387	3,197	204	124	1,511	99	60	157	8	2,912	207
1894.....	662	4,349	175	378	2,366	93	104	1,348	42	74	187	9	4,231	90
1895.....	555	2,905	85	275	1,259	42	82	1,138	27	92	162	4	4,798	98
1896.....	389	1,534	42	148	485	15	80	681	16	78	153	4	1,176	36
Totals.....	5,030	33,779	1,619	2,916	18,582	1,028	900	11,512	460	582	1,307	58	131,298 { 30,555	1,022 946
Averages, ten years	503	3,379	162	293	1,859	103	90	1,151	46	58	131	6	3,129	102
Average cases and deaths per outbreak for ten years, 1887-96	-----	6.72	.32	-----	6.31	.35	-----	12.79	.51	-----	2.25	.10	-----	-----

* Outbreaks in Detroit, Grand Rapids and a few other localities, where the disease was present throughout the whole year, are not included, owing to the difficulty in determining the beginning and ending of an outbreak in those localities. The localities which are thus excluded in 1896, are given in a footnote to Table 9 of this article; and for previous years, in foot-notes to similar tables in articles on scarlet fever for those years.

† The numbers of cases and deaths in this double column are found by multiplying "all outbreaks" for each year by the average numbers of cases or deaths per outbreak, in those outbreaks in which isolation and disinfection were both neglected. The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows:—(1) The 31,298 cases and 1,022 deaths are totals of the columns representing cases and deaths saved as explained in the † foot-note, (2) the 30,555 cases and 946 deaths are obtained by multiplying the average numbers of cases and deaths per outbreak for the ten years, 1887-96 (12.79 and .51, where isolation and disinfection were neglected) by the total number of outbreaks, to find the numbers which would have occurred if all outbreaks had been neglected, and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the ten-year period.

*Period of Incubation, in Scarlet Fever.*TABLE 11.—*Exhibiting the reported Period of Incubation, stated in days, in 124 instances of Scarlet Fever. Compiled from reports of Health Officers in Michigan, for the year 1896.*

Incubation period—Days..	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20	21	28	29	42
Instances in each period ..	4	3	6	*4	†7	‡6	§13	¶18	||10	**23	2	††2	2	‡‡11	§§2	2	¶¶1	3	2	1	|||2

* In 1 instance it was reported as about 4 days.

† In 4 of these instances it was reported as about 5 days.

‡ In 1 of these instances it was reported as about 6 days.

§ In 6 of these instances it was reported as about 7 days.

¶ In 4 of these instances it was reported as about 8 days.

|| In 2 of these instances it was reported as about 9 days.

** In 15 of these instances it was reported as about 10 days.

†† In 1 of these instances it was reported as about 12 days.

‡‡ In 4 of these instances it was reported as about 14 days.

§§ In 1 of these instances it was reported as about 15 days.

¶¶ In this instance it was reported as about 20 days.

||| In 1 of these instances it was reported as about 42 days.

The average period of incubation in the 124 reported instances is 9.8 days; the greatest number of instances given in any single period was in the 10-day period.

TABLE 12.—*Exhibiting, relative to 44 instances of Scarlet Fever in Michigan in 1896, the Reported Period of Incubation, within certain limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.
1 to 2	1.5	4 to 5	4.5	5 to 14	9.5	7 to 14	10.5	9 to 14	11.5
2 to 5	3.5	4 to 7	5.5	6 to 8	7.	8 to 9	8.5	9 to 14	11.5
2 to 5	3.5	4 to 10	7.	6 to 12	9.	8 to 12	10.	10 to 21	15.5
2 to 6	4.	5 to 6	5.5	7 to 8	7.5	8 to 12	10.	14 to 15	14.5
3 to 5	4.	5 to 7	6.	7 to 9	8.	8 to 12	10.	14 to 56	35.
3 to 6	4.5	5 to 8	6.5	7 to 10	8.5	8 to 14	11.	15 to 18	16.5
3 to 12	7.5	5 to 8	6.5	7 to 11	9.	8 to 20	14.	16 to 20	18.
3 to 21	12.	5 to 12	8.5	7 to 12	9.5	9 to 10	9.5	28 to 35	31.5
3 to 21	12.	5 to 14	9.5	7 to 14	10.5	9 to 13	11.		

The average of all the means, for the 44 instances, is 10 days.

AGES OF GREATEST PREVALENCE OF, AND MORTALITY FROM, SCARLET FEVER.

In Table 13 are shown the numbers of cases of, and deaths from scarlet fever in Michigan in 1896, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per

cent the deaths in each group were of the cases in that group, and the per cent the deaths in special groups were of all deaths.

Of the total numbers of cases and deaths reported to this office for the year 1896, the number of deaths per 100 cases was 3.1; and in the smaller numbers of cases and deaths concerning which the ages were stated, the number of deaths per 100 cases was 2.3: of the 2,646 cases of scarlet fever reported, the ages were stated of 1,891, which was 71 per cent of the cases; and of the 81 deaths reported, the ages were stated of 43, which was 53 per cent of the decedents.

By this table (13) it may be seen that the greatest number of cases of scarlet fever occurred in children under 10 years of age,—73.3 per cent of all cases, relative to which the age was stated, having occurred in that period of age. 22.5 per cent of all cases occurred in the next two age-periods, 10 to 20 years.

The greatest number of deaths occurred in the first five-year period,—60.5 per cent of all deaths having occurred in that age-period. The next

TABLE 13.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Scarlet Fever; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of All Deaths; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1896 which stated the ages.*

Number and per cent of Cases and Deaths in certain Age-groups.																			
Ages in groups of years.....	All ages known.	0-1.	1-2.	2-3.	3-4.	4-5.	0-5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	Over 60.
No. of cases.....	*1,891	24	46	121	173	179	543	844	331	94	36	23	12	5	2	1	0	0	0
Per cent the cases in each group were of all cases..	100	1.3	2.4	6.4	9.1	9.5	28.7	44.6	17.6	5.0	1.9	1.2	.6	.3	.1	.05	0	0	0
No. of deaths	43	1	1	11	7	6	26	15	2	0	0	0	0	0	0	0	0	0	0
Per cent the deaths in each group were of cases in that group.....	2.3	4.2	2.2	9.1	4.0	3.4	4.8	1.8	.6	0	0	0	0	0	0	0	0	0	0
Per cent the deaths in each group were of all deaths	100	2.3	2.3	25.6	16.3	14.0	60.5	34.9	4.7	0	0	0	0	0	0	0	0	0	0
Per cent the deaths in special groups were of all deaths	-----	60.5					95.3		4.7	0									

* Does not include those cases or deaths where the age was not stated.

greatest number of deaths, 34.9 per cent of all deaths, occurred in the second five-year period, 5 to 10 years.

The fourth line of this table (13) shows that the greatest fatality from this disease was in children under five years of age. The fatality in children from two to three years of age was double that of any other year of age. In 173 cases of persons over fifteen years of age, there were no deaths reported.

From Table 14 it may be seen that about ninety-five per cent of all the cases of scarlet fever and about ninety-seven per cent of all the deaths, in which the ages were stated, occurred in persons under twenty years of age. In the years, 1892-95, the proportions were about the same.

The per cent the cases and deaths in the age-periods were of all the cases and deaths, in which the ages were stated in the health officers' reports, is given in Table 14. This table shows the percentages for the same age-periods for each of the years, 1892-96, and for the five years, 1892-96, combined.

TABLE 14.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Scarlet Fever in the five years and in each of the years 1892-96; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths.—Compiled from all reports for the years 1892-96, which stated the ages.*

Year.		Total No in- cluded. *	Per Cent of Cases and Deaths in certain Age-groups.										
			All Ages.	0 to 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over
1892.	Cases	2,832	100	30.0	41.1	18.4	5.9	2.1	.9	1.0	.4	.1	.1
	Deaths.....	128	100	48.4	35.9	10.9	1.6	.8	0	1.6	0	.8	0
1893.	Cases	2,666	100	38.7	36.6	15.0	5.1	2.0	1.1	.8	.4	.3	.1
	Deaths.....	166	100	56.0	27.1	12.0	1.8	1.8	.6	0	0	.6	0
1894	Cases	2,595	100	36.4	38.5	15.0	5.4	1.8	1.6	.6	.4	.2	.2
	Deaths.....	91	100	71.4	16.5	5.5	4.4	1.1	1.1	0	0	0	0
1895	Cases	2,359	100	36.6	38.2	14.7	5.3	2.1	1.3	1.0	.5	.04	.3
	Deaths.....	83	100	60.2	19.3	10.9	7.2	2.4	0	0	0	0	0
1896.	Cases	1,891	100	28.7	44.6	17.6	5.0	1.9	1.2	.6	.3	.1	.05
	Deaths.....	43	100	60.5	34.9	4.7	0	0	0	0	0	0	0
1892-96.	Cases	12,343	100	34.3	39.6	16.1	5.3	19.8	1.2	.8	.4	.2	.2
	Deaths.....	511	100	57.9	26.8	9.8	2.9	1.4	.4	.4	0	.4	0

* In this column cases include both fatal and non-fatal cases.

TABLE 15.—*Exhibiting, by Sex, for each year of Age, and in certain Age-groups, the number of persons who died from Scarlet Fever during the year 1896, and the per cent the deaths in each Age-group were of deaths at all ages. (Compiled from such reports to the State Board of Health, as stated the sex and age.)*

Sex.			Number and per cent of Deaths by Sex, in certain Age-periods.															
	Ages in Years, and groups of Years.	All ages.	Under 5.				5-9.				10-14.				15 years and over.			
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Males.	No. of Deaths, by single Years	----	0	1	4	3	5	1	7	3	0	0	0	0	2	0	0	0
	No. of Deaths, by Groups of Years	26	13				11				2							
	Per cent the Deaths in each age-group were of the total deaths *among Males.	----	50.0				42.3				7.7				0			
	Average age at death, from Scarlet Fever	5.0																
	No. of deaths, by single Years	----	1	0	7	4	1	1	2	1	...	...	...	...	...	...	...	...
Females.	No. of Deaths, by Groups of Years	17	13				4				0				0			
	Per cent the Deaths in each age-group were of the total deaths *among Females.	----	76.5				23.5				0				0			
	Average age at Death, from Scarlet Fever	3.2																
	No. of Deaths, by single Years	----	1	1	11	7	6	2	9	4	0	0	0	0	2	0	0	0
	No. of Deaths, by Groups of Years	43	26				15				2							
Both sexes.	Per cent the Deaths in each age-group were of the total deaths *of both sexes.	----	60.5				34.9				4.7				0			
	Average age at Death, from Scarlet Fever	4.3																

* Deaths from Scarlet Fever.

From Table 15 it may be seen that the ages of 26 males and 17 females, who died from scarlet fever in 1896, were given. Of these, all but two males were reported to have been under eight years of age.

The average age of males who died from scarlet fever in 1896, and whose ages were reported, was 5 years, of females, 3.2 years, and of both sexes, 4.3 years.

TABLE 16.—*Exhibiting, by Sex, and in certain Age-groups, the per cent of persons who died from Scarlet Fever in Michigan, during the four years and each of the four years, 1893-96; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from Scarlet Fever.															
Year.	Sex.	Average age, Years.	No. of Deaths included.	Ages.—In Periods of Years. Per Cent of Deaths in each Period of Age.											
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1893.	Males.....	5.4	73	100	64.4	24.7	8.2	0	1.4	1.4	0	0	0	0	0
	Females.....	7.1	93	100	49.5	29.0	15.1	3.2	2.2	0	0	0	1.1	0	0
1894.	Males.....	5.0	42	100	71.4	19.0	4.8	2.4	0	2.4	0	0	0	0	0
	Females.....	5.6	49	100	71.4	14.3	6.1	6.1	2.0	0	0	0	0	0	0
1895.	Males.....	6.2	39	100	64.1	23.1	2.6	7.7	2.6	0	0	0	0	0	0
	Females.....	6.8	44	100	56.8	15.9	18.2	6.8	2.3	0	0	0	0	0	0
1896.	Males.....	5.0	26	100	50.0	42.3	7.7	0	0	0	0	0	0	0	0
	Females.....	3.2	17	100	76.5	23.5	0	0	0	0	0	0	0	0	0
1893-96.	Males.....	5.4	180	100	63.9	25.6	6.1	2.2	1.1	1.1	0	0	0	0	0
	Females.....	6.4	203	100	58.6	22.2	12.3	4.5	2.0	0	0	0	.5	0	0

Table 16 shows that for the four years, and each of the four years, 1893-96, the greatest per cent of both males and females who died from scarlet fever, and whose ages were reported, were under ten years of age.

TABLE 17.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Scarlet Fever, in Michigan, during the year 1896; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of non-fatal cases Years.	No. of cases included.	Age.—In Periods of Years												Per cent of (non-fatal) Cases in each Period of age.	
				All Ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.		
1893.	Males.....	7.9	1,133	100	41.3	36.4	14.1	3.6	2.2	1.1	.5	.5	.9	.2	0		
	Females..	8.7	1,367	100	33.7	38.1	16.0	6.7	1.8	1.2	1.0	.4	.4	0	.07		
1894.	Males....	8.2	1,122	100	37.7	38.6	13.6	5.8	1.8	1.3	.4	.3	.4	.1	.1		
	Females..	8.8	1,382	100	33.0	39.9	16.9	5.1	1.9	1.9	.7	.5	.1	0	.1		
1895.	Males.....	7.8	1,057	100	39.5	38.9	13.5	4.0	1.8	1.0	.7	.5	0	0	.1		
	Females..	9.1	1,219	100	32.5	39.0	15.9	6.2	2.3	1.5	1.4	.6	.1	.3	.2		
1896.	Males.....	7.0	827	100	31.8	45.8	16.2	4.1	1.3	.6	.1	0	0	0	0		
	Females..	8.5	1,021	100	24.9	44.1	19.1	5.9	2.4	1.8	1.1	.6	.2	.1	0		
1893-96.	Males.....	7.8	4,139	100	38.0	39.5	14.2	4.4	1.8	1.0	.5	.3	.1	.07	.5		
	Females..	8.8	4,989	100	31.6	40.0	16.9	6.0	2.1	1.6	1.0	.5	.2	.1	.1		

AVERAGE DURATION OF SCARLET FEVER. FATAL AND NON-FATAL CASES.

TABLE 18.—*Exhibiting, by sex of patient, by per cent of cases which died in specified periods of time, the duration (in days) of fatal cases of sickness from Scarlet Fever, in Michigan, during the years 1893-96. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Scarlet Fever.														
Year.	Sex.	No. of cases in- cluded.	Duration of Sickness :—Per cent of Deaths in each Period of Days.											
			All Periods.	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1893.	Males.....	60	100	38.3	28.3	8.3	8.3	10.0	1.7	1.7	0	0	0	3.3
	Females.....	82	100	41.5	22.0	14.6	9.8	6.1	1.2	1.2	0	0	2.4	1.2
1894.	Males.....	37	100	35.1	24.3	18.9	2.7	2.7	2.7	2.7	0	5.4	0	5.4
	Females.....	42	100	40.5	26.2	19.0	2.4	7.1	2.4	0	0	2.4	0	0
1895.	Males.....	25	100	44.0	20.0	12.0	8.0	4.0	8.0	0	4.0	0	0	0
	Females.....	35	100	40.0	28.6	11.4	2.9	2.9	5.7	2.9	2.9	2.9	0	0
1896.	Males.....	11	100	18.2	27.3	18.2	9.1	9.1	0	9.1	9.1	0	0	0
	Females.....	11	100	54.6	18.2	9.1	0	9.1	0	9.1	0	0	0	0
1893-96.	Males.....	133	100	38.8	25.6	12.8	6.8	6.8	3.0	2.3	1.5	1.5	0	3.0
	Females.....	170	100	41.8	24.1	14.7	5.9	5.9	2.4	1.8	.6	2.4	0	.6

From Table 18 it may be seen that of the fatal cases of scarlet fever, in the four years, and each of the four years, 1893-96, of which the interval between the day of being taken sick and the day of death was reported, the largest per cent, with the exception of males in 1896, died before the sixth day of sickness.

The average duration of sickness in fatal cases of scarlet fever in 1896 was 15.2 days for males, and 9 days for females.

From Table 19 it may be seen that of the non-fatal cases of scarlet fever in the four years and each of the four years, 1893-96, of which the interval between the day of being taken sick and the day of recovery was reported, the greatest per cent were sick from six to twenty-six days, and that the duration in each five-day period, for the four years, was nearly the same for both sexes.

The average duration of sickness for non-fatal cases of scarlet fever in 1896 was 21.6 days for males and 20.6 days for females.

TABLE 19.—*Exhibiting by Sex of patient, by per cent of cases which recovered in specified periods of time, the Duration (in days) of Non-Fatal cases of sickness from Scarlet Fever, in Michigan, during the years 1893-96. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Scarlet Fever.														
Year.	Sex.	No. of cases in- cluded.	Duration of Sickness:—Per Cent of Non-Fatal Cases in each Period of Days.											
			All Periods.	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	Over 50 days.
1893.	Males.....	687	100	4.8	26.3	23.0	14.0	11.6	9.0	3.8	3.5	1.6	1.3	1.0
	Females..	809	100	4.1	24.7	24.8	16.1	10.1	11.5	3.7	1.7	2.0	.2	1.0
1894.	Males	761	100	2.2	21.6	28.4	19.8	8.3	7.8	5.3	2.2	2.8	1.1	.7
	Females..	899	100	3.7	18.7	26.5	20.2	11.7	6.7	5.9	2.8	2.2	.4	1.2
1895.	Males	577	100	4.9	17.1	19.8	16.8	13.5	9.2	6.1	6.1	3.8	.9	1.9
	Females..	659	100	3.9	17.1	21.3	15.4	11.2	8.6	10.1	6.1	3.9	1.5	1.0
1896	Males.....	339	100	2.9	14.5	15.3	18.3	16.5	10.3	9.1	4.7	2.9	2.1	.6
	Females..	426	100	1.6	16.4	21.4	13.8	16.2	15.7	5.6	4.9	3.3	.5	.5
1893-96.	Males.....	2,364	100	3.7	20.9	22.8	17.2	11.7	9.2	5.6	3.9	2.7	1.2	1.1
	Females..	2,823	100	3.5	19.7	24.0	16.9	11.8	9.9	6.2	3.6	2.7	.6	1.0

RÖTHELN (GERMAN MEASLES) IN MICHIGAN IN 1896.

During the year ending December 31, 1896, there were reported to the Secretary of the State Board of Health 6 outbreaks of rōtheln, in 6 localities, resulting in 53 cases and no deaths.

The following is a list of localities from which rōtheln was reported:—

Benton Harbor city, Berrien Co.; Flint city, Genesee Co.; Campbell Tp., Ionia Co.; Sand Lake Vil., Kent Co.; Lapeer city, Lapeer Co.; and Royal Oak Vil., Oakland Co.

In regard to restrictive measures used in these 53 cases of rōtheln, in 5 cases there were no statements, or doubtful statements, made, in one case both isolation and disinfection were enforced, in one case isolation alone was enforced, and in 46 cases isolation was neglected, but disinfection was enforced.

The main reason for efforts for the restriction of rōtheln is the fact that scarlet fever is so often mistaken for rōtheln, so that in restricting what is apparently rōtheln a more fatal disease is sometimes restricted.

In all cases the public health should be given the benefit of any doubt, and precaution taken against the spread of any contagious disease which may prove to be dangerous.

MEASLES IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1896.

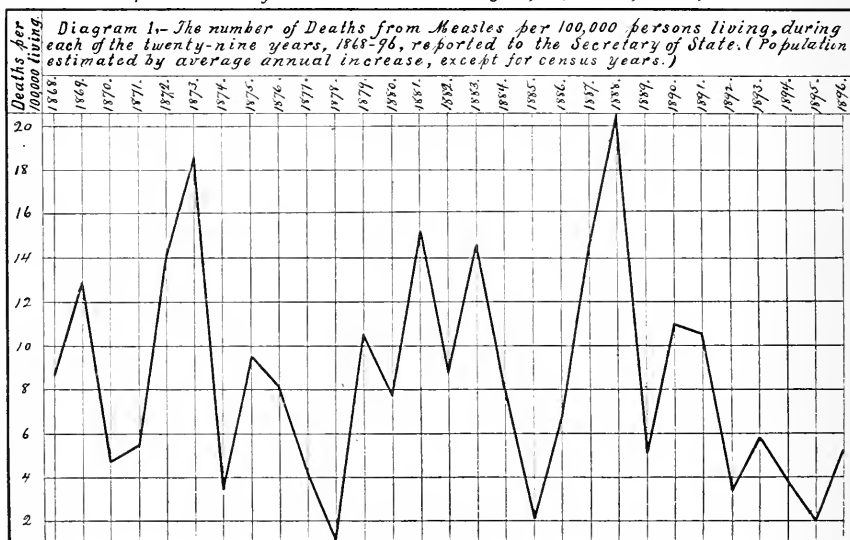
There were reported to the Secretary of the State Board of Health, in all, 405 outbreaks of measles, in 366 local jurisdictions, as having occurred in Michigan during the year 1896; and in these outbreaks there were reported to have occurred 15,409 cases and 156 deaths.

For the preceding year, 1895, there were reported 3,870 cases and 12 deaths in 238 local jurisdictions.

The Office of the State Board of Health is making constant efforts to get local health officials, and especially to induce the people generally to take measures to prevent the spread of measles, and to make reports to the local health officers so that they can make valuable reports to the Secretary of the State Board of Health, concerning that disease in the several localities; but it is probable that a large number of the cases and deaths are not yet reported.

In former years it has been the rule that more deaths from measles have been reported to the office of the Secretary of State than to the office of the Secretary of the State Board of Health, but during the year 1896 the deaths from measles returned to the Secretary of State were 121 while the deaths from that disease reported to the State Board of Health were 156. This shows that the efforts of the Board have been of avail; it also tends to support the statement, made in former reports of this Board, that the deaths returned to the Secretary of State should probably be increased by about forty per cent to make them equal the actual number of deaths which occurred.

Reported Deaths from Measles in Michigan, 29 Years, 1868-96.



MEASLES IN 1896, COMPARED WITH PREVIOUS YEARS.

According to Reports made to the Secretary of the State Board of Health.

TABLE 1.—*Exhibiting the numbers of outbreaks, cases and deaths from Measles, the Number of localities in which they occurred, together with the average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, reported to the Office of the State Board of Health for each of the 7 years, 1890-96; with the departure of the same for 1896, from 1895, and from the average of the same for the 6 years, 1890-95.*

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Av. No. of Cases per Outbreak.	Reported Deaths.	Av. No. of Deaths per Outbreak.	Deaths Per 100 Cases.
1890.....	421	407	*11,911	28.3	140	.33	1.2
1891.....	394	379	*12,173	30.9	149	.38	1.2
1892.....	238	229	*3,830	16.1	76	.32	2.0
1893.....	365	326	*7,334	20.1	119	.33	1.6
1894.....	359	339	10,518	29.3	55	.15	.5
1895.....	268	238	3,870	14.4	12	.04	.3
1896.....	405	366	15,409	38.0	156	.39	1.0
Average for 6 years, 1890-1895.....	341	320	8,273	24.3	92	.27	1.1
Departure of 1896 from 1895.....	+137	+125	+11,539	+23.6	+144	+.35	+.7
Departure of 1896 from the average for 6 years, 1890-95.....	+64	+46	+7,136	+13.7	+64	+.12	-.1

* Only the fatal cases were reported from Detroit.

The compilation of information relative to the prevalence of measles in Michigan, as reported to the Office of the Secretary of the State Board of Health, has been continued for a number of years.

In Table 1, beginning with the year 1890, are shown, by years, the numbers of reported outbreaks of measles, the numbers of infected localities, the numbers of cases and deaths reported as having occurred from this disease in each year, the average reported cases and deaths per outbreak, and the per cent ratio of deaths to cases. There is marked fluctuation from year to year in the prevalence of this disease, according to the reports to the Secretary of the State Board of Health.

According to the Reports Made to the Secretary of State.

Table 2, showing the number of deaths from measles per 100,000 persons living, reported to the Secretary of State, probably quite accurately represents the annual fluctuations of, but not the total death-rate from measles in Michigan during the 29 years, 1868-96. Probably the omissions are about the same in every year, therefore these statistics of the State Department are useful for comparing one year with another. A diagram graphically representing Table 2, for the 29 years, 1868-96, is printed herewith.

TABLE 2.—*Exhibiting the reported number of deaths from measles per 100,000 persons living in Michigan in each of the 29 years, 1868-96. (Compiled from the Secretary of State's Vital Statistics of Michigan. Population for intercensal years estimated by average annual increase based on National and State Censuses.)*

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	
Deaths (per } 100,000, etc.) }		8.66	12.88	4.72	5.45	14.12	18.56	3.37	9.50	8.10	4.13	1.03	10.49	7.63	15.21	
Year.		1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths } etc. }		8.68	14.54	7.91	2.04	6.75	14.56	20.62	5.08	10.94	10.51	3.29	5.76	3.75	1.93	5.22

DISTRIBUTION OF MEASLES BY DIVISIONS AND COUNTIES DURING 1896.

Table 3 exhibits the distribution of measles in 1896, by tiers of counties of the State according to the reports to the Secretary of the State Board of Health; showing the reported numbers of cases and sickness-rates for each division. Table 4 and the accompanying map exhibit in slightly different ways the reported measles by counties during the year 1896, the reported numbers of cases and deaths, and the sickness and death-rates are shown in Table 4.

Sickness-rates from Reported Measles in 1896.

Considering the State by tiers of counties, Table 3 shows that the greatest reported prevalence of measles was in the Upper Peninsula, where the sickness-rate was 200.4 cases per 10,000 inhabitants; the next highest sickness-rates were in the seventh (178.4) and ninth (137.8) tiers of counties. In only one other tier, the eighth (with 79.5) was the rate above the average for the State. The lowest sickness-rate, 6.7 cases per 10,000 inhabitants, was in the eleventh tier.

By counties, the greatest sickness-rate reported from this disease in 1896 was in Iron county, where the ratio of cases to population was 528.84 per 10,000. Other counties where the sickness-rates were largely in excess of the average rate for the whole State, were: Houghton 485.71, Gogebic 401.60, Clare 364.08, Kalamazoo 347.54, Bay 337.73, Crawford 313.47, Luce 287.71, Keweenaw 282.21, and Genesee 220.84 cases per 10,000 of population; whereas the average sickness-rate for the State was only 66.55 cases per same number of inhabitants.

During the year measles was reported from all except eight counties in the State.

Death-rates from Measles in 1896, according to the reports.

If only the fatal and severe cases are reported in any given locality, the death-rate will necessarily appear very large. Probably about all that can be inferred from the death-rates, as they now appear, are the proportions of all cases which are reported in the several parts of the State.

TABLE 3.—*Exhibiting the Population of Michigan for the year 1896, by tiers of counties (Upper Peninsula as one tier); also the number of cases and the number of deaths from Measles REPORTED from each of these divisions for 1896, and the numbers of cases and deaths per 10,000 population of each division.*

Counties in Groups, most Northern ones First.			Estimated Population, 1896.*	Reported Cases of Measles, 1896.	Reported Cases per 10,000 of Population.	Reported Deaths from Measles, 1896.	Reported Deaths per 10,000 of Population.
State			2,315,517	15,409	66.6	156	0.7
Upper Peninsula	Alger.	Mackinac.	219,561	4,400	200.4	23	1.1
	Delta.	Chippewa.					
	Schoolcraft.	Keweenaw.					
	Luce.	Marquette.					
	Houghton.	Iron.					
Eleventh tier of counties.....	Ontonagon.	Menominee.	44,907	30	6.7	0	0
	Gogebic.	Dickinson.					
	Baraga.						
Tenth tier of counties.....	Emmet.	Cheboygan.	50,469	185	36.7	5	1.0
	Charlevoix.	Presque Isle.					
	Leelanaw.						
Ninth tier of counties.....	Antrim.	Alpena.	44,715	616	137.8	5	1.1
	Otsego.						
	Montmorency.						
Eighth tier of counties.....	Benzie.	Crawford.	68,430	544	79.5	0	0
	G'd.Traverse	Oscoda.					
	Kalkaska.	Alcona.					
Seventh tier of counties.....	Manistee.		161,297	2,877	178.4	67	4.2
	Wexford.	Ogemaw.					
	Missaukee.	Iosco.					
Sixth tier of counties.....	Roscommon.		94,010	371	39.5	8	0.9
	Mason.	Gladwin.					
	Lake.	Bay.					
Fifth tier of counties.....	Osceola.	Huron.	251,350	973	38.7	8	0.3
	Clare.	Arenac.					
	Oceana.						
Fourth tier of counties.....	Newaygo.	Midland.	389,922	1,681	43.1	15	0.4
	Mecosta.						
	Isabella.						
Third tier of counties.....	Muskegon.		232,834	655	28.1	4	0.2
	Montcalm.	Tuscola.					
	Gratiot.	Sanilac.					
Second tier of counties.....	Saginaw.		525,805	2,407	45.4	12	0.2
	Ottawa.	Shiawassee.					
	Kent.	Genesee.					
First tier of counties.....	Ionia.	Lapeer.	232,233	670	28.9	9	0.4
	Clinton.	St. Clair.					
	Allegan.	Livingston.					
	Barry.	Oakland.	525,805	2,407	45.4	12	0.2
	Eaton.	Macomb.					
	Ingham.						
	Van Buren.	Washtenaw.	525,805	2,407	45.4	12	0.2
	Kalamazoo.	Wayne.					
	Calhoun.						
	Jackson.		232,233	670	28.9	9	0.4
	Berrien.	Hillsdale.					
	Cass.	Lenawee.					
	St. Joseph.	Monroe.	232,233	670	28.9	9	0.4
	Branch.						

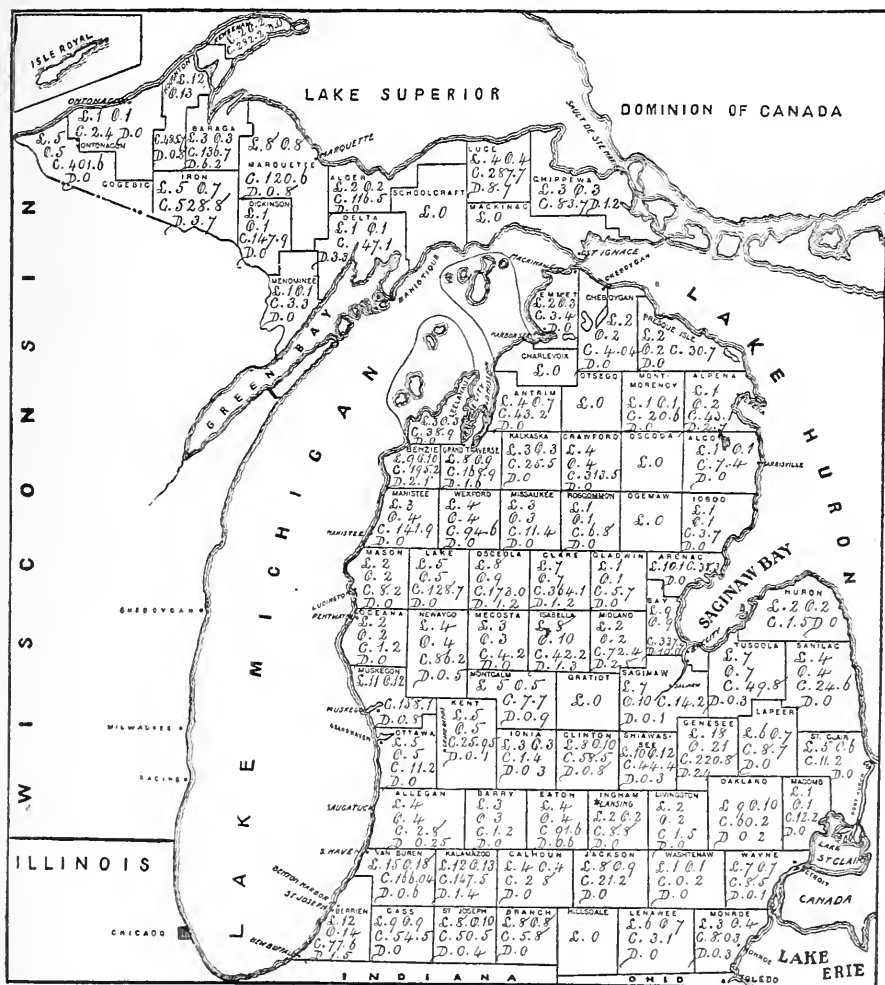
* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894.

TABLE 4.—*Numbers of Cases and Deaths reported from Measles per 10,000 persons living in each county in Michigan during the year 1896. (Compiled from reports of health officers, clerks, etc.)*

State and Counties.	Estimated Population of Michigan for 1896.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated Population of Michigan for 1896.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,315,517	15,409	156	66.55	.67						
Alcona	5,423	4	0	7.38	0	Keweenaw	2,693	76	0	282.21	0
Alger	1,459	17	0	116.52	0	Lake	5,393	72	0	128.73	0
Allegan	39,303	11	1	2.80	.25	Lapeer	28,712	25	0	8.71	0
Alpena	18,785	81	5	43.12	2.66	Leelanau	10,281	40	0	38.91	0
Antrim	13,434	58	0	43.17	0	Lenawee	48,588	15	0	3.09	0
Arenac	7,573	29	0	38.29	0	Livingston	20,227	3	0	1.48	0
Baraga	4,830	66	3	136.65	6.21	Luce	2,294	66	2	287.71	8.72
Barry	23,657	3	0	1.27	0	Mackinac	6,941	0	0	0	0
Bay	63,750	2,153	64	337.73	10.04	Macomb	32,674	40	0	12.24	0
Benzie	9,476	185	2	195.23	2.11	Manistee	27,056	384	0	141.93	0
Berrien	47,810	371	7	77.60	1.46	Marquette	38,972	470	3	120.60	.77
Branch	25,913	15	0	5.79	0	Mason	19,440	16	0	8.23	0
Calhoun	49,458	14	0	2.83	0	Mecosta	21,245	9	0	4.24	0
Cass	21,288	116	0	54.49	0	Menominee	24,345	8	0	3.28	0
Charlevoix	11,702	0	0	0	0	Midland	14,499	105	4	72.42	2.76
Cheboygan	14,857	6	0	4.04	0	Missaukee	7,908	9	0	11.38	0
Chippewa	16,974	142	2	83.66	1.18	Monroe	33,603	27	1	8.03	.30
Clare	8,185	298	1	364.08	1.22	Montcalm	34,919	27	3	7.73	.86
Clinton	26,139	153	2	58.53	.77	Montmorency	2,914	6	0	20.59	0
Crawford	2,584	81	0	313.47	0	Muskegon	35,980	569	3	158.14	.83
Delta	21,228	100	7	47.11	3.30	Newaygo	18,449	159	1	86.18	.54
Dickinson	15,074	223	0	147.94	0	Oakland	43,392	261	1	60.15	.23
Eaton	32,880	301	2	91.55	.61	Oceana	17,050	2	0	1.17	0
Emmet	11,825	4	0	3.38	0	Ogemaw	5,666	0	0	0	0
Genesee	41,115	908	10	220.84	2.43	Ontonagon	8,432	2	0	2.37	0
Gladwin	5,246	3	0	5.72	0	Osceola	17,398	301	2	173.01	1.15
Gogebic	14,542	584	0	401.60	0	Oscoda	1,757	0	0	0	0
Gr'd Traverse	19,595	331	3	168.92	1.58	Otsego	5,055	0	0	0	0
Gratiot	28,830	0	0	0	0	Ottawa	40,946	46	0	11.23	0
Hillsdale	30,078	0	0	0	0	Presque Isle	6,523	20	0	30.66	0
Houghton	48,568	2,359	4	485.71	.82	Roscommon	1,469	1	0	6.81	0
Huron	34,112	5	0	1.47	0	Saginaw	81,634	116	1	14.21	.12
Ingham	40,701	36	0	8.84	0	Sanilac	34,623	85	0	24.55	0
Ionia	35,830	5	1	1.40	.28	Schoolcraft	7,782	0	0	0	0
Iosco	10,898	4	0	3.67	0	Shiawassee	33,805	150	1	44.37	.30
Iron	5,427	287	2	528.84	3.69	St. Clair	55,429	62	0	11.19	0
Isabella	22,767	96	3	42.17	1.32	St. Joseph	24,953	126	1	50.49	.40
Jackson	47,287	100	0	21.15	0	Tuscola	35,364	176	1	49.77	.28
Kalamazoo	43,448	1,510	6	347.54	1.38	Van Buren	31,318	520	2	166.04	.64
Kalkaska	5,880	15	0	25.51	0	Washtenaw	44,159	1	0	.23	0
Kent	127,946	332	1	25.95	.08	Wayne	310,135	262	4	8.45	.13
						Wexford	15,432	146	0	94.61	0

* Population estimated by average annual increase, (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894.

BY COUNTIES. THE REPORTED CASES AND DEATHS PER 10.000 INHABITANTS.



S. = Sexalities; O. = Outbreaks; C. = Cases per 10,000 population; D. = Deaths per 10,000 population.

Table 3 shows the greatest death-rate to have been in the seventh tier of counties, no deaths were reported from the eighth and eleventh tiers.

Table 4 shows that the greatest death-rate from this disease during the year (10.04 deaths per 10,000 of population) was in Bay county. Other counties where the death-rates were much above the average death-rate for the State, were: Luce 8.72 and Baraga 6.21. The lowest death-rate, where deaths occurred, was in Kent county, .08 of one death per 10,000 of population. No deaths were reported from 41 counties where cases of measles were present during the year. Of the 156 reported deaths from measles 64 occurred in Bay county.

The Fatality, or "Case-Mortality" from Measles.

The fatality from measles in 1896, *i. e.*, the proportion of reported cases which proved fatal, was for the whole State, 1 per cent, or one death to each 100 cases reported. The maximum fatality (20 per cent) occurred in Ionia county, where the reports to this office show only 5 cases of measles with one death; the next highest fatalities were in Montcalm county (11 per cent) and Allegan county (9 per cent).

It is quite probable that these reported deaths are nearly correct, and that the reported cases are only a small part of the numbers which actually occurred in Ionia, Montcalm and Allegan counties.

Number of Outbreaks of Measles in Each Month of the Year 1896.

TABLE 5.—*Exhibiting the reported number of outbreaks of Measles which Began, the number which Ended, and the number which were Present, in each Month of the Year 1896, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began . . .	21	26	33	43	56	49	28	12	5	14	32	36	355
Number ended	3	7	21	29	37	38	59	25	11	9	16	26	281
Number present . . .	36	50	76	94	116	123	107	55	33	35	55	72	-----

The last line of figures in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 74 more beginnings than endings of outbreaks reported during the year 1896.

TABLE 6.—*Exhibiting the Number and Per Cent of Cases of Measles and the Number and per cent of Localities infected in Michigan in each Month during the Year 1896. (Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases present...	513	773	935	1,284	2,294	2,104	1,334	569	294	299	694	1,126
Per cent of cases present...	3.3	5.0	6.1	8.3	14.9	13.7	8.7	3.7	1.8	1.9	4.5	7.3
Number of localities	36	50	76	93	116	123	106	55	33	35	55	71
Per cent of localities.....	9.8	13.7	20.8	25.4	31.7	33.6	29.0	15.0	9.0	9.6	15.0	19.4

The first line of figures in Table 6, exhibits the number of cases reported sick in each month or any part of the month, and the third line the number of infected localities reported during the month or any part of the month.

The second line of figures in this table, exhibits the per cent the cases sick in each month are of the whole number of cases reported to this Office for the year 1896, and the fourth line the per cent of localities infected in each month, in the same period.

SOURCE OF CONTAGIUM OF CASES OF MEASLES.

Of the 15,409 cases of measles reported to this Office, as having occurred in the year 1896, the local health officials reported relative to the source of contagium in ways which may be summarized as follows:—Traced to a former case, 3,586; from outside jurisdiction, 125; probably from an outside jurisdiction, 11; unknown, 10,560; not stated, 1,125; attributed to infected articles, etc., 2; total, 15,409.

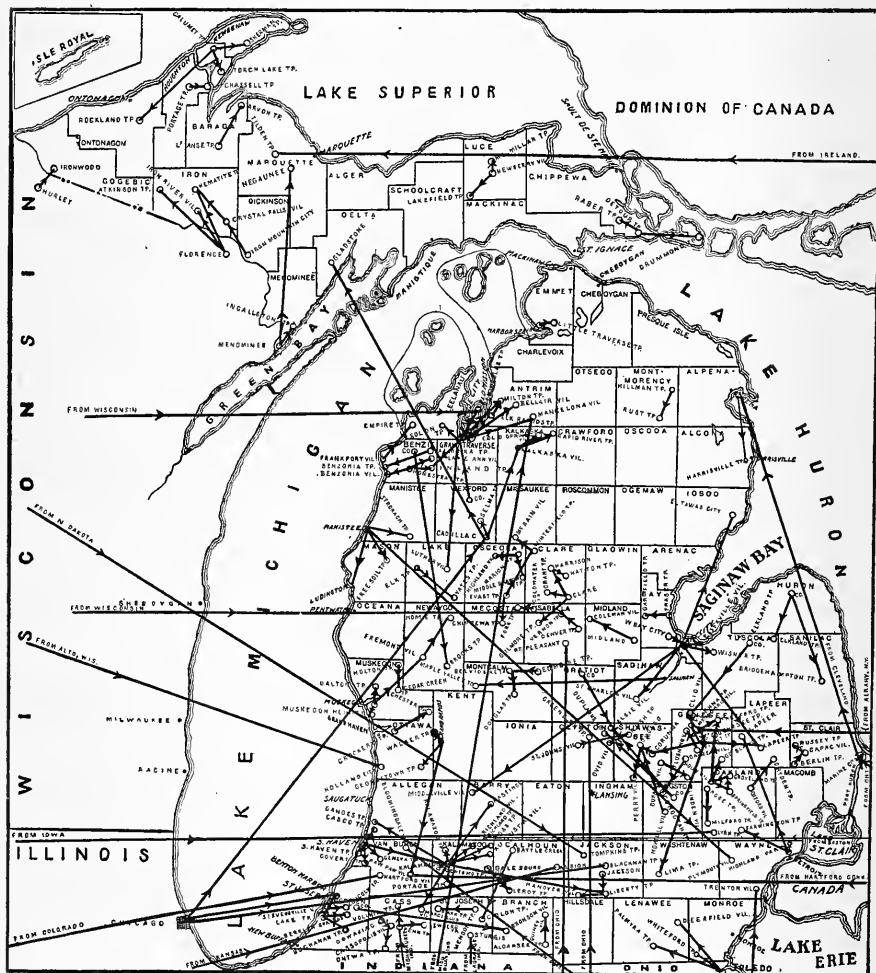
TABLE 7.—*Reported Source of Contagium of Cases of Measles in Michigan during the year 1896.*

	Cases.
Traced to a former case	3,586
Reported as coming from outside jurisdiction	125
Reported as probably coming from an outside jurisdiction	11
Unknown (includes reported "epidemic," "exposure," "sporadic")	10,560
Not stated	1,125
Attributed to infected articles, houses, etc.	2
All cases	15,409

Movements of Contagium of Measles in Michigan in 1896.

On the accompanying map, the spread of measles in Michigan in the year 1896, as reported to this Office is shown by black lines which connect the localities; the arrow-head indicates the direction of the movement in each case.

MOVEMENTS OF CONTAGIUM OF MEASLES IN 1896.



THIS MAP ILLUSTRATES TABLE 8. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS.

TABLE 8.—*First, second and third localities, where the second locality was infected with Measles from the first, and the third was infected from the second; and the numbers of cases and deaths from Measles in the first, second and third localities, with the dates of the beginning and ending of each outbreak.* (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Antrim county: Elk Rapids township... (Apr. 4-July 30.)	35	0	Antrim county: Milton township..... (June 12-July 20.)	2	0			
Baraga county: L'Anse township.....	*	----	Baraga county: Arvon township.....	25	1			
Bay county: Fraser township.....	*	----	Bay county: Garfield township....	30	0			
						Barry county: Middleville village... (July 30-Aug. 29.)	1	0
						Bay county: Essexville village.... (Mar. 9-May 24.)	264	6
						Hampton township..	205	0
						Iosco county: East Tawas city..... (Apr. 8-Apr. 25.)	4	0
Bay county: West Bay City.....	600	8	Bay county: Bay City..... (Feb. 1—.)	1000	50	Lapeer county: Lapeer township (Apr.—.)	1	0
						Saginaw county: St. Charles village... (May 3-July 16.)	14	0
						Tuscola county: Wisner township (—Apr.)	57	1
Benzie county: Almira township.....	*	----	Benzie county: Benzonia township ... (May 2—.)	5	0			
Benzie county: Frankfort village.....	*	----	Leelanau county: Empire township (June 1-June 15.)	1	0			
			Benzie county: Benzonia village (Apr.-May 2)	4	0			
Benzie county: Homestead township... (Apr. 9-May 28.)	35	2	Inland township..... (June —.)	5	0			
			Lake Ann village..... (May 15-July 10.)	67	0			
Benzie county.....	----	----	Newaygo county: Brooks township..... (Feb.-Mar. 6.)	3	0			
Berrien county: Buchanan township....	*	----	Berrien county: Lake township..... (Feb. 15-May 9.)	205	3	Berrien county: Berrien Springs vill.. (Mar.-Apr. 20.)	50	0
						Stevensville village†.	7	1
						(Mar. 16-Apr. 20.)		

* Measles was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

† From Stevensville village to St. Joseph city, Berrien Co., 25 cases. From Stevensville village to Lincoln township, Berrien Co., 3 cases.

TABLE 8.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Berrien county: Three Oaks township....	3	0	Berrien county: New Buffalo township	1	0			
Berrien county.....			Branch county: Bronson village.....	1	0			
Branch county: Algansee township.....	*		Branch county: Quincy village.....	2	0			
Calhoun county: Battle Creek city..... (Jan. 14—.)	6	0	St. Joseph county: Colon township..... (Oct. 25-Dec. 24.)	12	0			
Cass county: Dowagiac city.....	*		Cass county: Cassopolis village..... (Apr. 12-May 15.)	17	0	Cass county: Ontwa township..... (Apr.-June 6.)	12	0
Chippewa county: Detour township..... (Apr. 6-June 15.)	92	1	{ Chippewa county: Drummond township..... (May 27-Nov. 27.)	27	0			
			{ Raber township..... (May 1-Aug.)	23	1			
Clare county: Clare city.....	200	1	{ Clare county: Grant township.....	4	0	Clare county: Hatton township....	17	0
			{ Harrison city..... (July 8-July 29.)	3	0	{ Hatton township.... (—July.)		
Clinton county: St. Johns village.....	*		Isabella county: Gilmore township.....	6	1			
Dickinson county: Iron Mountain city..... (Jan. 1-Apr. 2.)	223	0	Shiawassee county: Rush township.....	1	0	Clinton county: Ovid village.....	1	0
Emmet county: Harbor Springs village.	*		Iron county: Crystal Falls village..	257	0	Iron county: Hematite township... (May 1-May 26.)	3	0
Genesee county: Flint township..... (—July 9.)	33	0	Emmet county: Little Traverse Tp....	2	0			
Genesee county: Gaines village.....	18	0	Genesee county: Flushing village..... (May 25-July 19.)	7	0			
Gratiot county.....			Livingston county: Cohoctah township....	2	0			
			Clinton county: Elsie village.....	27	0			
Houghton county: Calumet township..... (Apr. 25-Nov. 25.)	766	0	{ Houghton county: Torch Lake township..	800	0			
			{ Torch Lake township.. (June 5-Dec. 20.)					
			Keweenaw county: Sherman township..... (July 12-Sept. 3.)	15	0			
			Ontonagon county: Rockland township.... (June 27-July 22.)	2	0			
Houghton county: Portage township.....	*		Houghton county: Chassell township..... (Dec. 1-Feb. 7, 1897.)	102	0			
			{ Sanilac county: Bridgehampton Tp.... (May 25-June 5.)	4	0			
Huron county.....			Tuscola county: Elkland township..... (May 15-June 12.)	2	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 8.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Isabella county: Coldwater township.... (June-July.)	8	0	Mecosta county: Fork township..... (June 20-July 18.)	6	0			
Isabella county: Denver township.....	23	0	Isabella county: Vernon township..... (Apr.-July 10.)	21	0			
Jackson county: Jackson city.....	*	---	Jackson county: Liberty township..... (Nov. 26-Jan. 15, '97.)	2	0			
Kalamazoo county: Galesburg village..... (Apr. 15-Aug. 10.)	51	0	Calhoun county: LeRoy township..... (June 5-June 29.)	2	0			
			{ Kent county: Walker township..... (Apr. 26-Oct.)	4	0			
Kent county: Grand Rapids city..... (Jan. 11-Nov.)	305	1	{ Ottawa county: Georgetown township. (Feb. 4-Apr. 24.)	2	0			
			{ Van Buren county: Paw Paw village..... (July 1-July 12.)	2	0			
Lake county: Elk township.....	30	0	Lake county: Yates township..... (May 1-May 15.)	1	0			
Livingston county: Howell village.....	*	---	Shiawassee county: Owosso city..... (Mar. 6-Apr. 10.)	2	0	Shiawassee county: Perry village..... (Mar. 10-Mar. 21.)	2	0
			{ Clinton county: Du Plain township... Elsie village..... (Dec.-Mar. 24, '97.)	85 50	0 0			
Livingston county.....			{ Luce county: Lakelfield township... (July-July.)	2	0			
Luce county: Newberry village..... (May 15-July 6.)	36	2	{ McMillan township.... (Sept.-Oct. 26.)	18	0			
			{ Manistee county: Stronach township.... (Apr. 16-Apr. 22.)	1	0			
Manistee county: Manistee city..... (Feb. 16-June 26.)	376	0	{ Mason county: Free Soil township... (June 2-July 25.)	10	0			
			{ Ludington city..... (June 1-July 1.)	6	0			
			{ Wayne county: Plymouth village..... (May 9-May 20.)	1	0			
Menominee county: Menominee city.....	*	---	{ Marquette county: Negaunee city.....	8	0			
			{ Menominee county: Ingallston township..	9	0			
Midland county: Midland city.....	*	---	Midland county: Coleman village.....	100	4			

* This foot-note is on the bottom of the first page of this table.

TABLE 8.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Montcalm county: Edmore village.....	*	---	Montcalm county: Belvidere township... (May 1-July 8.)	5	1	Montcalm county: Douglass township... (July 6-July 27.)	2	0
Montmorency county: Hillman village.....	*	---	Montmorency county: Rust township.....	6	0			
Muskegon county: Holton township.....	2	0	Muskegon county: Cedar Creek township	27	0			
			{ Muskegon county: Dalton township..... (Jan. 2-May 4.)	120	0			
Muskegon county: Muskegon city..... (Jan.-May.)	206	2	{ Muskegon Heights vill. (Feb. 20-Apr. 16.)	7	0			
			{ Newaygo county: Fremont village..... (Jan. 8-Apr. 13.)	150	1	Newaygo county: Home township..... (Apr. 24-July 20.)	5	0
Oakland county: Oxford village.....	130	0	Lapeer county: Dryden township.....	10	0			
Oakland county: Rose township.....	3	0	Oakland county: Milford township.....	1	0			
Oakland county: Springfield township... (Oct. —.)	4	0	Oakland county: Groveland township...	50	0	Oakland county: Holly village..... (Nov. 9-Jan., '97.)	60	1
Osceola county: Evart township.....	3	0	{ Clare county: Winterfield township... (Oct. 15-Dec. 25.)	32	0	Missaukee county: McBain village..... (Nov. 24-Feb., '97.)	41	0
			{ Mecosta county: Chippewa township... (Oct. 25-Nov. 19.)	2	0			
Osceola county: Marion township.....	40	0	{ Osceola county: Highland township... Middle Branch Tp.....	48 32	3 0			
Ottawa county: Crockery township.....	*	---	Ottawa county: Chester township.....	1	0			
Saginaw county: Saginaw city..... (Mar. 22, '96-Apr., '97.)	257	1	Montcalm county: Maple Valley Tp..... (July 10-Aug. 17.)	7	2			
Shiawassee county: Durand village..... (Oct. 14-Dec. 12.)	8	0	Genesee county: Linden village..... (Nov. 30—.)	127	0			
St. Clair county: Berlin township.....	*	---	St. Clair county: Capac village..... (Apr. 12-June 10.)	35	0	St. Clair county: Mussey township..... (June 20-July, '96)	14	0
St. Joseph county: Mendon township..... (Nov., '95-Apr., '96.)	50	0	St. Joseph county: Park township..... (Apr. 11-Apr. 25.)	4	0			
Tuscola county.....	---	---	Genesee county: Clio village..... (Dec. 11-Jan. 18, '97.)	12	0	Genesee county: Vienna township..... (Dec. 27-Mar., '97.)	22	0

* This foot-note is on the bottom of the first page of this table.

† From Holly Vil. to Grand Blanc Tp., Genesee Co., 4 cases and 4 deaths. From Holly Vil. to Springfield Tp., Oakland Co., 4 cases. From Holly Vil. to Genesee Tp., Genesee Co., 2 cases. From Genesee Tp. to Thetford Tp., Genesee Co., 24 cases.

TABLE 8.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Van Buren county: South Haven village.....	408	2	{ Allegan county: Casco township..... (Mar. 30-Apr. 26.) Kalamazoo county: Kalamazoo city..... (Mar.-Dec. 4.) Van Buren county: Covert township..... (Aug. 3-Sept.) Geneva township..... (May 26-Oct. 30) South Haven Tp..... (Apr.—)	3	0	{ Allegan county: Ganges township ---- (June 23-July 2.)	1	0
						Barry county: Hastings city ----- (Apr. 5-May.)	1	0
						Cass county: Marcellus village ---- (—Apr. 20.)	7	0
						Jackson county: Liberty township*... (Oct.-Nov. 30.)	6	0
						Kalamazoo county: Augusta village ----- (May 4-July.)	100	0
						Galesburg village ---- (Apr. 16-Aug. 10.)	51	1
						Kalamazoo township (May 19-July 5.)	6	1
						Oshkemo township.... (June-July.)	5	0
						Portage township.... (Sept. 23-Oct. 30.)	4	0
						Richland village..... (May 27-June 17.)	2	0
Wayne county: Detroit city..... (Jan.-Dec. 26.)	199	2	{ Lapeer county: Lapeer city (Dec. 4-Jan. 17, '97.) Oakland county: Farmington township (July-July.) Farmington township (Nov.—)	2	0	Ross township..... (May 27-July 10.)	55	0
						{ Antrim county: Bellaire village..... (June 15—.) Mancelona village... (May 8-May 20.) Mancelona village... (June 15-July 24.) Milton township..... (May 29-July 20.)	1	0
							1	0
							8	0
							10	0
Wexford county			Gr'd Traverse county: Traverse City..... (Mar. 19-July 31.)	224	1	{ Benzie county: Inland township..... (May 25—.)	1	0
						Lake county: Luther village..... (Apr. 27-May 25.)	7	0
						Leelanau county: Solon township..... (June-Oct.)	35	0
Northern part of State ..			Lenawee county: Hudson township.....	7	0			
From the South.....			Wayne county: Trenton village.....	30	2			

* From Liberty Tp. to Hanover Vil., Jackson Co., 2 cases.

TABLE 8.—CONTINUED.—*Movement of Infection of Measles Into Michigan from outside the State.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Boston			Kalamazoo county: Richland township.....	3	0			
Canada.....			Wayne county: Highland Park village.....	25	0			
			Berrien county: Benton Harbor city.....	2	0			
Chicago.....			Jackson county: Blackman township	1	0	Delta county: Gladstone city..... (May-Oct. 21.)	100	7
			Wexford county: Cadillac city..... (Apr. 3-Aug. 6)	140	0	Wexford county: Selma township..... (June 22-July 3.)	3	0
Colorado.....			Van Buren county: Hartford village.....	1	0	Kalkaska county: Kalkaska village*..... (May 30-July 9.)	8	0
Connecticut: Hartford.....			Van Buren county: Paw Paw village.....	5	0			
Indiana: Lagrange.....			St. Joseph county: Sturgis city.....	8	0			
Indiana: Middlebury.....			Antrim county: Mancelona village.....	1	0			
Indiana: Mishawaka.....			Cass county: Penn township..... (Mar. 31-May 14.)	68	0	Cass county: Volinia township..... (May 4-June 15.)	2	0
Iowa.....			Oakland county: Lyon township.....	4	0	Newberg township .. (Apr. 16-May 6.)	6	0
Ireland.....			Marquette county: Tilden township.....	100	0			
Kansas.....			Calhoun county: Albion city.....	1	0			
New York: Albany.....			Genesee county: Mt. Morris village..... (Jan. 14-Mar. 6.)	30	0	Genesee county: Flint city†..... (Feb. 5-Aug. 23.)	300	4
North Dakota.....			Jackson county: Tompkins township ..	4	0	Thetford township .. (Nov. 15-.)	4	0
Ohio: Cleveland.....			Alpena county: Alpena city.....	2	0			
			Alpena county: Alpena city..... (Nov. 28-Mar., 1897.)	300	5	Alcona county: Harrisville township (Dec. 18-Feb. 1, '97.)	7	0
			Clinton county: Greenbush township..	5	0			
Ohio.....			Isabella county: Mt. Pleasant city.....	1	0			
			Van Buren county: Bloomingdale village..	5	0			

* From Kalkaska Vil. to Coldsprings Tp., Kalkaska Co., 2 cases. From Kalkaska Tp. to Rapid River Tp., Kalkaska Co., 5 cases.

† From Flint city to Lima Tp., Washtenaw Co., 1 case. From Flint city to Vienna Tp., Genesee Co., 10 cases. From Flint city to Lapeer Tp., Lapeer Co., 6 cases. From Flint city to Corunna city, Shiawassee Co., 5 cases. From Corunna city to Owosso city, Shiawassee Co., 6 cases.

TABLE 8.—CONCLUDED.—*Movement of Infection of Measles Into Michigan from outside the State.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Ohio: Toledo			{ Lenawee county: Deerfield village 3 0 Palmyra township..... 1 0			G'd Traverse county: Traverse City..... 1 0 (Apr. —.)	1	0
Ontario: Wallaceburg			{ Monroe county: Whiteford township .. 1 0					
Wisconsin			St. Clair county: Marine City..... 1 0					
Wisconsin: Alto			{ G'd Traverse county: Peninsular township... 26 1 (Apr. 6-July 15.)					
Wisconsin: Hurley			{ Isabella county: Vernon township..... 21 1					
Wisconsin: Florence			Ottawa county: Holland city..... 1 0					
Wisconsin: Hurley			{ Iron county: Atkinson township.... 16 1 Hematite township.... 3 0 Iron River village..... 3 0					
Wisconsin: Hurley			Gogebic county: Ironwood city..... 50 0					
Probable Movement of Infection of Measles.								
Alger county: Munising township..... 12 0 (May 15-July 5.)			Alger county: Munising village..... 5 0 (May 25-July 15.)					
Clinton county: Elsie village..... 27 0 Nov.-Dec. 25.)			Clinton county: Ovid township..... 4 1 (Nov. 30-Dec. 22.)					
Gogebic county: Ironwood city 50 0 (Nov.-Nov.)			Gogebic county: Bessemer township ... 26 0 (Nov. 20-Feb. 16, '97.)					
G'd Traverse county: Traverse City..... 224 1 Mar. 19 July 31.)			{ G'd Traverse county: Green Lake township. 7 0 (July 10-Aug. 24.) Paradise township.... 30 0 (June 25-July 26.)					
Kent county: Grand Rapids..... 305 1 Jan. 11-Nov.)			Allegan county: Saugatuck village 1 0 (June 28-July 10.)					
Probable Movement of Infection of Measles Into Michigan from outside the State.								
Transatlantic steamer ..			Houghton county: Calumet township 766 0 (Apr. 25-Nov. 25.)			Houghton county: Houghton village..... 86 0 (July 21-Mar., '97.)		

NEGLECT OF MEASURES TO RESTRICT MEASLES, VIOLATIONS OF PUBLIC-HEALTH LAWS, ETC.—RESULTS.

Neglected Outbreak of Measles in the City of Alpena.

An outbreak of measles occurred in the city of Alpena in which the health officer states there were about 300 cases with 5 deaths. The first case in the outbreak was that of a boy who had returned from a visit in Cleveland ten days before being taken sick. The Health officer says "He came down with measles in school * * * fumigated the school * * * closed the room for two weeks, but the disease spread just the same. Isolation could be accomplished only in a few families. The general opinion was that measles was not dangerous, and no precautions were taken to keep their children from taking it."

The onset of measles is probably the time when the disease is most infectious. A child "coming down" with measles in a schoolroom not only exposes all other pupils, but exposes them at a time when the infection in him is most virulent. In case of such exposure to measles, the schoolroom should be disinfected before its further occupancy. The children who have been exposed should be isolated until the expiration of the period of incubation, and until those who contract the disease are recovered from it, and, in any event, until they have been cleansed, their clothing disinfected and they are clothed in such a manner that they will not carry the infection to their associates.

The mortality in the above-mentioned outbreak was sufficient to show that measles is not a harmless disease, but one of such importance as to justify vigorous means for preventing its spread.

Neglected Outbreak of Measles in the city of Bessemer.

G. L. Loope, M. D., health officer of the city of Bessemer, Gogebic county, wrote to the Secretary of this Board, Jan'y 2, 1896, relative to an outbreak of measles in his jurisdiction, in which no effort at restriction was made. Dr. Loope's letter read as follows:—

"We commence the New Year with no dangerous communicable disease except measles. We have had about 500 cases, and it has been an impossibility to keep track of the cases, and as it is not a dangerous disease except in the adult, I see no reason why children should be prevented from having it. I have taken my children to the disease in order that they might have it at the proper age. The outbreak is nearly over now and no fatalities have occurred.

"The disease is prevalent in all our towns here. I endeavored to keep a little track of the cases at the onset, but had about 100 cases in the first two days, many of whom had no physician. I found that it was an impossibility to give a correct report, so dropped it. All the health officers that I am acquainted with do not report the disease. If however when we get through with the disease you want a report I suppose I can make a house to house canvass and give it correctly."

Neglect of an Outbreak of Measles resulted in 350 cases of that disease.

Dr. J. H. Eddy, health officer of Wakefield township, wrote to the Secretary of this Board, Feb. 27, 1896, relative to an outbreak of measles in his jurisdiction, in which he encouraged the spread of the disease, with the result that there were about 350 cases. His letter is as follows:—

"Your favor duly received, and in reply I send you herewith final report of outbreak of measles which I fear will be of little use to you. In the first place I kept no track of these cases, for I do not consider measles a dangerous disease, as my report will show, as I had over 350 cases without a fatal case. I used no disinfectants, and, on the contrary, advised parents to expose their children in order that they might take the measles while they were young. Other diseases such as scarlet fever, etc., I should isolate."

Dr. Eddy says there were no deaths from measles in this outbreak, but he probably does not know how many of the patients will suffer from secondary troubles due to the measles infection. The trouble and expense of caring for these patients would repay many times the little effort necessary to restrict the disease. It is wrong and criminal to wilfully expose persons to any infectious disease, for no person can know in what patient it may assume a malignant form and be followed by loss of life.

MEASLES INFECTION CARRIED IN A LETTER.

The following instance is interesting as it shows how measles may be spread by a letter sent from an infected household into an uninfected one.

Chas. Beaver, M. D., health officer of Mancelona village, Antrim county, wrote to the Secretary of this Board, March 18, 1896, as follows:—

"Since reporting that case of measles, I have ascertained that twelve days before the boy was taken with the measles, the family got a letter from Middlebury, Ind., from W. W. Wise, and the letter stated that their little girl was very sick with measles. The Barnard boy got this letter and played with it, and his mother says, chewed up part of it. Now if you think that the letter was the cause of the Barnard boy having measles, will you kindly fill in that fact in the report that I sent you. So far I have had no other case of measles here."

By care on the part of the health officer and the family of the patient, the outbreak was restricted to the one case.

CORRESPONDENCE RELATIVE TO THE LAWS REQUIRING THAT MEASLES AND OTHER COMMUNICABLE DISEASES BE REPORTED TO THE HEALTH OFFICER.

H. J. Garber, M. D., health officer of Essexville village, wrote to the Secretary of this Board, March 18, 1896, relative to the difficulty of getting physicians to report measles, and making inquiries relative to the laws requiring such diseases to be reported, as follows:—

"I have had considerable trouble getting physicians to report measles; the consequence is both the village of Essexville and the township of Hampton are overrun with measles. Some physicians have told patients the law did not require reporting of measles, nor a notice of same on premises.

"I wish to know whether sections 44 and 45 on pages 13 and 14 of the Public Health Laws of 1890 have ever been before the courts? if so where can a report be found?

"Do I understand by Sec. 49 (of the same laws) that a local board of health can pass laws conflicting with Sections 44 and 45, relative to measles? If so how would you proceed to do so?

"Any information you may give which will lead me to the proper solution of the measles question will be gratefully received."

The Secretary of this Board answered the above-quoted letter from Dr. Garber, as follows:—

"I do not know of any reason why the law you refer to should go before the courts, for the reason that I do not know of any better or more competent authority, to judge or say what is a dangerous communicable disease, than the State Board of Health.

"Act 158, laws of 1895, which took effect August 30, 1895, makes it the duty of householders and physicians to report all cases of dangerous communicable diseases directly to the health officer, and as the State Board of Health has included measles in the list of 'diseases dangerous to the public health,' therefore the law requires that measles should be reported and the premises placarded.

"Relative to the local board of health passing any laws or making regulations conflicting with a State law, it would not be legal for it to do so, at least such regulations would have no binding force."

Dr. Garber wrote to the Secretary of this Board again, April 19, as follows:—

"On the second instant the president at my request called the board of health together to take action regarding measles. The enclosed dodger is one of three hundred printed and distributed one to each house in the village. The board also caused a notice to be inserted in both the Bay City Tribune and the Times Press on Saturday and Sunday, April 4 and 5, much the same as the wording of enclosed dodger but referring more particularly to physicians."

The following is a copy of the notice mentioned in Dr. Garber's letter:—

NOTICE! MEASLES.

All householders are hereby notified to report at once to the Health Officer all cases of Measles or other contagious diseases, existing on their premises. Any such persons failing to comply, are liable to a fine not exceeding One Hundred Dollars, or imprisonment in the county jail for Ninety days, or both, in the discretion of the court.

M. J. BEAUDETTE,
Pres. Board of Health.

H. J. GARBER, M. D.,
Health Officer.

Measles Sometimes widely spread by Schools.

In many instances where the number of reported cases in an outbreak had been great, the statements of the health officers showed that the first cases had taken sick while in the schoolroom or at some public gathering.

IMMIGRANTS, EXPOSED TO MEASLES, WHO SETTLED IN MICHIGAN.

Notices to the State Board of Health, and by the State Board to local health officers.

During the year 1896, 40 notices were received from Dr. Joseph H. Senner, U. S. Commissioner of Immigration at New York City, containing lists of names and destinations of immigrants exposed to some dangerous communicable disease, and stating that *measles* had occurred on board 39 steamships, and *measles* and *small-pox* on board 1 steamship, arriving at New York. One notice was received from the Surgeon of the SS. Canada, which arrived at Quebec, stating that measles had occurred on board. All of these 41 steamships had passengers intending to settle in Michigan. Copies of these notices were made and forwarded to the health officer of each locality (eighty-six in all) for which the immigrants were destined. The purpose was to enable local health officials to guard against the spread of measles.

In two instances during the year 1896, local health officers stated in their reports to the Secretary of this Board that the source of measles contagium in their jurisdictions had been from infected immigrants, below is given the detailed information relating to these outbreaks:—

Measles Infection alleged to have been carried into Tilden township, Marquette county, by Immigrants.

Dr. N. D. Kean, health officer of Tilden township, wrote to the Secretary of this Board, July 1, 1896, reporting an outbreak of measles in his jurisdiction, and stated relative to the source of contagium that it was from immigrants. Dr. Kean's letter is as follows:—

"I can trace this outbreak to a case of measles which was contracted on board ship, and which was not reported or seen by a physician. For several weeks it prevailed among an ignorant class of French Canadians, who had no medical attendance and who continued sending their children to school, thereby exposing almost the entire population of the township. I report the first case that I have been able to state definitely as measles, and have quarantined all who have been sick or are at present sick. There is great danger of a serious epidemic. All cases to the present have been mild. The people here are generally foreigners of an ignorant class, and are very hard to restrain. Please send reading matter to be distributed. * * * Would be greatly obliged for any suggestions on your part."

The health officer stated that precautionary measures had been taken, all houses placarded, and an officer appointed to prevent persons going to or from infected houses.

There were about 100 cases in this outbreak in spite of efforts on the part of the health officials to prevent the spread of the disease. The reason for this is probably shown in the following statement of the health officer:—"The whole township attended closing exercises of the school, where children were, who have since taken sick."

Measles probably carried into Calumet township, Houghton county, by Immigrants.

Robert M. Wetzel, health officer of Calumet township, in reporting to the Secretary of this Board, relative to an outbreak of measles in his jurisdiction, stated that the infection was probably from a Trans-Atlantic Steamer. He also stated that no isolation or disinfection was observed. "The epidemic swept the Township; it was impossible to observe any laws of the board of health." There were 766 cases in the outbreak, and it lasted from April 25 to Nov. 25, 1896. No deaths were reported.

During the months of March, April and May notice was given the Secretary of this Board, in four different instances, of the arrival at the Port of New York of steamers infected with measles, and carrying immigrants destined for Calumet township, Houghton county. This fact taken in connection with the health officer's report of "infection was probably from a Trans-Atlantic Steamer" emphasizes a point which the Secretary of this Board has been trying for a number of years to bring before the notice of the health authorities of this country and of the State of Michigan, that immigrants are a frequent source of the introduction of infectious diseases into this country. This can only be avoided by a more rigid inspection, disinfection and quarantine at the ports of entry or at such points on the American-Canadian border as are passed by immigrants entering the United States.

Comparisons of the Mortality from Measles in Michigan and Great Britain.

Measles is a much more serious disease in some parts of the world than here in Michigan. In the British Islands the mortality from measles often exceeds that from either diphtheria or scarlet fever, while in Michigan the death-rate from scarlet fever has been from 2 to 4 times as great as from measles, and the death-rate from diphtheria is from 2 to 7 times as great as from measles.

Comparisons of the death-rates from measles in Michigan and England can be made in tables given below, also comparisons of the death-rates from measles with the several other diseases given in the tables.

TABLE A.—MICHIGAN.—*Death-rates from Measles, Diphtheria, etc., to a Million persons living, in groups of years, 1870-94.**

Causes of Death.	5 years, 1870-74.	5 years, 1875-79.	5 years, 1880-84.	5 years, 1885-89.	5 years, 1890-94.
Measles.....	95	67	107	98	63
Diphtheria.....	139	472	813	474	456
Scarlet Fever.....	498	279	269	146	146
Whooping-cough.....	118	95	85	75	66
Small-pox.....	79	29	22	2	9

* From the Twenty-ninth Registration Report for Michigan, 1895.

TABLE B.—ENGLAND.—*Death-rates from Measles, Diphtheria, etc., to a Million persons living, in groups of years, 1871-95.**

Causes of Death.	5 years, 1871-75.	5 years, 1876-80.	5 years, 1881-85.	5 years, 1886-90.	5 years, 1891-95.
Measles.....	373.2	384.8	413.0	468.4	407.8
Diphtheria.....	120.8	121.8	156.2	169.6	253.0
Scarlet Fever.....	758.6	679.6	435.8	240.6	182.4
Whooping-cough.....	498.6	527.0	458.6	443.6	398.4
Small-pox.....	410.8	78.4	78.0	13.6	20.0

* From Fifty-eighth Annual Report of the Registrar-General, England, 1895.

Mortality from Measles in Michigan and Ireland, Compared.

From the Quarterly Reports of the Registrar-General of Ireland, for the year 1896, it appears that there were 495 deaths reported from measles; calculated on the estimated population this shows a death-rate of 108.5 per million of persons living.* In Michigan for the same year the death-

* During the year 1897 there were 1,039 deaths from measles in Ireland, or a death-rate of 228.3 per million of the estimated population.

rate from measles per million persons living was 52.3. (For the previous year, 1895, the rate was only 19.3.)

In the year 1896, 38,995 persons emigrated from Ireland. A great majority of these emigrants probably came to America; many of them possibly carrying measles infection on their persons or in their baggage.

Estimated Number of Outbreaks and Cases of Measles Prevented and Lives Saved by Isolation and Disinfection.

Tables 9 and 10 and the following diagram compare the average numbers of cases and deaths in outbreaks of measles where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 10 it may be seen that during the seven years, 1890-96, there were about 26 times as many cases per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced; and that while there were six-tenths of one death per outbreak where restrictive measures were neglected, no deaths occurred where those measures were enforced.

By Table 9 it may be seen that during the year 1896 there were reported to the office of the State Board of Health 399 outbreaks of scarlet fever, with 17,068 cases and 158 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 34,506 cases and 359 deaths, and taking from these respectively the cases (17,068) and deaths (158) which did occur, leaves 17,438 cases and 201 deaths indicated as prevented in these 399 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 2,430 outbreaks which occurred during the seven years, 1890-96, is 91,605 cases and 767 lives. This is shown in Table 10.

** Definition of Outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

In the compilation of the reports for Tables 9 and 10 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

TABLE 9.—Measles in Michigan in 1896: Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 399 outbreaks reported; (2) in the 177 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 3 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 25 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 10 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 17 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 146 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 21 outbreaks in which Isolation and Disinfection were both enforced.

(1) All outbreaks. (399 outbreaks *)	(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (177 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (3 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (25 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (10 outbreaks.)		(6) Isolation enforced—Disinfection neglected. (17 outbreaks.)		(7) Isolation and Disinfection both neglected. (146 outbreaks.)		(8) Isolation and Disinfection both enforced. (21 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals....	17,068	158	4,178	26	0	0	67	1	64	0	12,626	131	54	0
Averages....	42.78	.40	23.60	.15	0	0	6.70	.10	3.76	0	86.48	1.90	2.57	.40

* A definition of the term "outbreak," and the facts relative to methods of compilation of outbreaks, are printed in foot-note on the preceding page of this Report.

† These figures are graphically represented in the diagram opposite this page, entitled "Isolation and Disinfection restricted Measles in Michigan in 1896."

Isolation and Disinfection Restrict Measles.

Measles in Michigan in 1896:- Exhibiting the average numbers of cases and deaths per outbreak - in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)

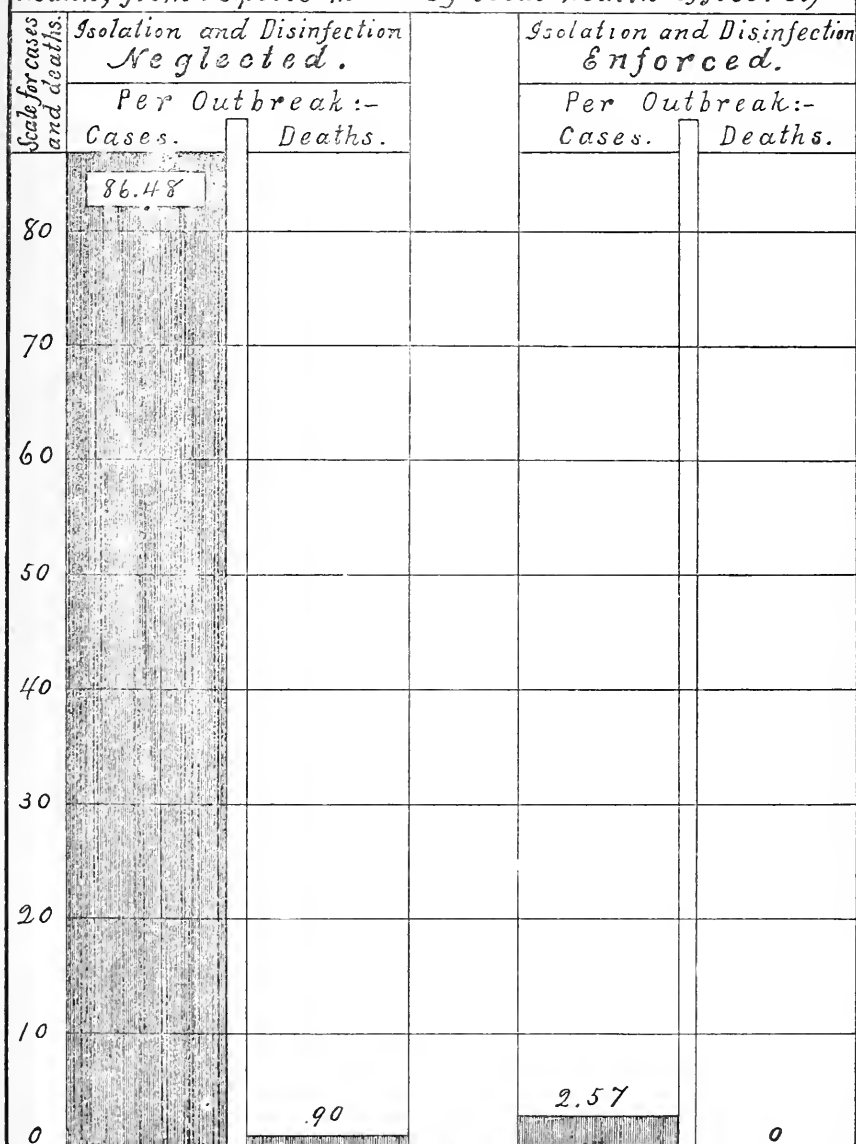


TABLE 10.—*Exhibiting for the seven years, and for each of the seven years 1890-96, the numbers of Reported Outbreaks, Cases and Deaths from measles; also for this seven-year Period, the average number of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection or both were Doubtful; Isolation and Disinfection both Neglected; Isolation and Disinfection both Enforced; and, also, the Numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

Years.	All Outbreaks*			Isolation or Disinfection or both not Mentioned or Statements Doubtful.			Isolation and Disinfection Neglected.			Isolation and Disinfection Enforced.			Cases and Deaths Indicated as having been Prevented by Isolation and Disinfection.†	
	Outbreaks	Cases.	Deaths	Outbreaks	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Cases.	Deaths.
1890.....	419	11,189	103	353	6,326	59	57	4,819	44	6	19	0	24,223	220
1891.....	382	12,388	118	309	6,492	59	71	5,920	63	11	27	0	20,347	231
1892.....	236	4,406	67	187	2,427	45	31	1,953	22	7	8	0	10,462	101
1893.....	357	5,440	71	228	2,569	53	70	2,681	14	10	24	0	8,223	0
1894.....	358	7,345	49	246	4,180	42	70	2,971	7	13	32	0	7,849	0
1895.....	269	4,462	13	152	2,660	7	56	1,563	6	25	72	0	3,013	14
1896.....	399	17,068	158	177	4,178	26	146	12,626	131	21	54	0	17,438	201
Totals for the seven years, 1890-96.....	2,430	62,248	579	1,662	28,842	291	501	32,533	287	93	236	0	{ 491,605 95,459 }	{ 767 879 }
Annual averages for the seven years, 1890-96.....	347	8,883	83	237	4,120	42	72	4,618	41	13	34	0	13,086	110
Average cases and deaths per outbreak, 1890-96.....		25.6	.2		17.4	.2		64.9	.6		2.5	0		

* For the years 1890-93 inclusive, and 1896, outbreaks in Detroit and Grand Rapids are not included, because of the difficulty of determining the beginning and ending of the outbreak. The outbreak in that city in the year 1894 was a "continuous" outbreak in 1893 and extended into the year 1894. † The numbers of cases and deaths in this double column are found by multiplying "All Outbreaks" for each year by the average number of cases and deaths in that year. The numbers of cases and deaths in which isolation and disinfection both were neglected for the year, would be deduced from the results thus obtained, the cases or deaths as the case may be, which were reported to have occurred that year to learn the numbers that would have occurred if efforts for the restriction of the disease had not been made. The instances in which isolation and disinfection were enforced are still so few that the evidence is not yet very satisfactory. ‡ The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows:— (1) the 91,605 cases and 767 deaths are totals of the columns representing cases and deaths saved as explained in the † footnote. (2) the 95,459 cases and 879 deaths are totals of the columns representing cases and deaths per outbreak for the seven years, 1890-96 (64.9 and .6 where isolation and disinfection were neglected) by the total number of outbreaks to find the numbers which would have occurred if all outbreaks had been neglected, and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the seven-year period.

*Period of Incubation in Measles.*TABLE 11.—*Exhibiting the reported period of Incubation, stated in days, in 115 instances of Measles. Compiled from reports of Health Officers in Michigan, for the year 1896.*

Incubation period—days.....	5	6	7	8	9	10	11	12	14	15	16	18	21
Cases in each period.....	3	*3	†30	‡5	§8	¶22	||3	**11	††19	1	3	3	‡‡4

* In 2 instances it was reported as *about* 6 days.† In 7 instances it was reported as *about* 7 days.‡ In 2 instances it was reported as *about* 8 days.§ In 4 instances it was reported as *about* 9 days.¶ In 13 instances it was reported as *about* 10 days.|| In 2 instances it was reported as *about* 11 days.** In 4 instances it was reported as *about* 12 days.†† In 8 instances it was reported as *about* 14 days.‡‡ In 1 instance it was reported as *about* 21 days.

The average of the above 115 reported periods of incubation is about 10.5 days.

TABLE 12.—*Exhibiting, relative to 57 instances of Measles in Michigan in 1896, the Reported Period of Incubation, within certain limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.
1 to 7	4.	7 to 10	8.5	8 to 9	8.5	10 to 12	11.
2 to 3	2.5	7 to 10	8.5	9 to 10	9.5	10 to 12	11.
3 to 5	4.	7 to 11	9.	9 to 10	9.5	10 to 14	12.
3 to 6	4.5	7 to 14	10.5	9 to 10	9.5	10 to 14	12.
3 to 10	6.5	7 to 14	10.5	9 to 10	9.5	10 to 14	12.
3 to 14	8.5	7 to 14	10.5	9 to 12	10.5	10 to 14	12.
4 to 5	4.5	7 to 14	10.5	9 to 12	10.5	10 to 15	12.5
4 to 14	9.	7 to 14	10.5	9 to 14	11.5	10 to 15	12.5
5 to 10	7.5	7 to 14	10.5	9 to 14	11.5	10 to 20	15.
5 to 17	11.	7 to 15	11.	9 to 14	11.5	10 to 20	15.
5 to 21	13.	7 to 16	11.5	9 to 21	15.	10 to 21	10.5
6 to 10	8.	7 to 18	12.5	9 to 25	17.	10 to 30	20.
6 to 21	13.5	7 to 20	13.5	9 to 30	19.5	12 to 15	13.5
7 to 10	8.5	7 to 21	14.	10 to 12	11.	12 to 15	13.5
7 to 10	8.5						

The average of all the means. for the 57 instances is 10.7 days.

*Ages of Greatest Prevalence of, and Mortality from Measles.**

The reports of local health officers in Michigan, for the year 1896, stated the ages of 5,355 persons who were sick with measles, and of 30 persons who died of that disease. Table 13 represents, in certain age-groups, the numbers of cases and of deaths from measles; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in special groups were of all deaths,—compiled from all reports for the year 1896, which stated the ages.

By Table 13 it may be seen that the greatest proportion of cases of measles was of children under 10 years of age, 76.1 per cent of all cases having occurred in that age-period; that 21.0 per cent of cases were of persons from 10 to 25 years of age; and 2.9 per cent were of persons over 25 years of age.

TABLE 13.—*Exhibiting in certain Age-Groups, the number of Cases and the number of deaths from Measles; the per cent that the cases in each group were of all cases of known ages; the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group.—Compiled from all reports for the year 1896 which stated the ages.*

		Number and per cent of Cases and Deaths in certain Age-groups.																	
Ages in groups of years.	All ages known.	Under 1.	1.	2.	3.	4.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60 and over.
No. of cases	15,355	109	262	354	396	453	1574	2501	732	251	139	65	41	26	12	8	2	0	4
Per cent the cases in each group were of all cases of known ages ..	100.	2.0	4.9	6.6	7.4	8.5	29.4	46.7	13.7	4.7	2.6	1.2	.8	.5	.2	.2	.04	0	.1
No. of deaths	30	6	8	6	3	0	23	2	3	1	0	0	0	0	0	0	1	0	0
Per cent the deaths in each group were of cases in that group...	.6	5.5	3.1	1.7	.8	0	1.5	.1	.4	.4	0	0	0	0	0	0	50	0	0
Per cent the deaths in each group were of all deaths, at known ages	100.	20.	26.7	20.	10.	0	76.7	6.7	10.	3.3	0	0	0	0	0	0	3.3	0	0
Per cent the deaths in special groups were of all deaths, known ages		76.7						20			3.3								

* In compiling data relative to ages, used in tables in this article, each age-period begins and ends on the birthday. For arranging the ages by single years or in age-periods the following method is pursued:—From birth to one year old is the *first* year. Those one year old and less than two years old are classed in the second year. The third year of age includes all persons over two years and less than three years of age, and so on for each succeeding year.

In dividing the ages into five-year periods, the first period includes all ages from birth to five years, or all *under* five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.

† Does not include those cases or deaths where the age was not stated.

In 1896 the greatest proportion of deaths from measles was reported to have occurred in children under 5 years of age, 76.7 per cent of all deaths having occurred in that age-period; that 20 per cent of deaths occurred in the age-period from 5-20 years.

Table 14 exhibits the numbers of cases and deaths, in which the ages were stated; the per cent the cases in each age-group were of all cases, and the per cent the deaths in each age-group were of all deaths in the five years and in each of the five years, 1892-6.

There are two erroneous and very harmful beliefs, quite prevalent among parents,—that measles cannot ultimately be escaped any more than teething, and that the least dangerous time for persons to have the disease is while quite young children. Whatever ground there may be for these beliefs elsewhere, Table 9 and the diagram illustrative of it, and Tables 13 and 14 of this article show that none exists in Michigan; but that on the contrary, facts here bear evidence that measles is a preventable disease; and that it is *more* fatal to young children than to persons in the middle ages.

TABLE 14.—*Exhibiting in certain Age-Groups, the number of Cases and the number of Deaths from Measles in the five years and in each of the five years 1892-96; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths.—Compiled from all reports for the years 1892-96 which stated the ages.*

Year.		Total No. in- cluded.	Per Cent of Cases and Deaths in certain Age-groups.*													
			All ages.	Un- der 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 Years and over
1892.	Cases.....	786	100	28.5	30.0	18.6	12.7	3.9	2.9	1.7	1.0	0.3	0.1	0	0.1	0.1
	Deaths.....	34	100	41.2	44.1	5.9	0	2.9	2.9	0	0	0	0	0	2.9	0
1893.	Cases.....	3,064	100	32.5	35.1	12.0	9.3	4.5	3.0	2.1	0.9	0.6	0.2	0.2	0.07	0.07
	Deaths.....	22	100	41.0	13.6	9.1	4.5	4.5	9.1	9.1	0	4.5	0	0	0	4.5
1894.	Cases.....	4,807	100	33.7	41.4	12.8	5.5	3.0	1.6	1.0	.6	.3	.3	.02	0	.04
	Deaths.....	20	100	45.0	20.0	5.0	10.0	10.0	10.0	0	0	0	0	0	0	0
1895.	Cases.....	1,172	100	19.5	40.1	18.3	9.3	5.2	3.2	1.6	1.2	.5	.5	.3	.3	0
	Deaths.....	5	100	60.0	0	40.0	0	0	0	0	0	0	0	0	0	0
1896.	Cases.....	5,355	100	29.4	46.7	13.7	4.7	2.6	1.2	.8	.5	.2	.2	.04	0	.1
	Deaths.....	30	100	76.7	6.7	10.0	3.3	0	0	0	0	0	0	3.3	0	0
1892-96.	Cases.....	15,184	100	30.6	41.3	13.5	6.6	3.4	1.9	1.2	.7	.3	.2	.1	.04	.06
	Deaths.....	111	100	50.5	18.0	13.5	4.5	2.7	4.5	1.8	.9	.9	0	.9	0	1.8

* The method of compiling ages in the years 1892, '93 and '94 is explained in foot-note on page 363 of the Annual Report of this Board for 1895. The method of compiling ages in the years, 1895-6 is explained in foot-note under Table 13 of this Report.

On page 342 of the Annual Report of this Board for the year 1894 is given a diagram which graphically represents the figures in a table similar to Table 14; showing for the two years, 1892-93, the per cent of deaths which occurred in each age-period.

TABLE 15.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Measles, in Michigan, during the years, 1893-96; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of persons who re-covered. Years.	No. of cases in-cluded.	Age.—In Periods of Years. Per cent of (non-fatal) Cases in each Period.*													
				All Ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.
1893.	Males.....	10.28	1,446	100	31.3	37.2	10.3	8.4	5.7	3.3	2.1	1.0	.5	.1	.07	0	.07
	Females..	10.22	1,596	100	33.5	33.6	12.5	10.2	3.4	2.8	2.1	.9	.6	.2	.3	.1	.06
1894.	Males.....	8.49	2,424	100	33.9	43.2	12.1	4.8	2.9	1.3	.7	.5	.3	.3	0	0	0
	Females..	9.04	2,363	100	33.4	39.7	13.5	6.1	3.0	1.7	1.3	.7	.3	.3	.04	0	.08
1895.	Males.....	9.90	579	100	21.6	41.6	18.7	6.6	5.2	2.4	1.9	.7	.7	.5	.2	0	0
	Females..	11.20	588	100	17.2	38.9	17.9	12.1	5.3	3.9	1.4	1.7	.3	.5	.3	.5	0
1896.	Males.....	7.73	2,650	100	28.8	48.1	13.5	4.3	2.8	.9	.7	.5	.2	0	.04	0	.2
	Females..	7.87	2,675	100	29.4	45.8	13.9	5.1	2.4	1.5	.8	.5	.3	.3	0	0	0
1893-6.	Males.....	9.10	7,099	100	30.5	43.7	12.8	5.5	3.6	1.7	1.1	.6	.3	.2	.04	0	.1
	Females..	9.58	7,222	100	30.6	40.5	13.8	7.1	3.1	2.0	1.3	.8	.3	.3	.1	.1	.03

* On a preceding page, a foot-note to the sub-head under which this table appears, explains these age-groups.

Table 15 shows that of the 7,099 males reported to have recovered from measles in the years, 1893-96, of which the ages were stated, 43.7 per cent occurred in the age-period from 5 to 9 years, and 30.5 per cent occurred in children of under 5 years, 12.8 per cent occurred in the period from 10 to 14 years and from this age-period the per cent greatly decreased.

The percentages for females correspond closely with those for males.

TABLE 16.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups, who died of Measles during the years, 1893-96.*

Year.	Sex.	Average age of decedents. Years.	No. of cases included.	Per Cent of Deaths in certain Age-groups.*											
				All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.	
1893.	Males.....	11.2	10	100	60	10	0	10	0	10	0	0	10	0	
	Females.....	19.2	12	100	25	16.7	16.7	0	8.3	8.3	16.7	0	0	8.3	
1894.	Males.....	10.4	11	100	36	18	9	18	18	0	0	0	0	0	
	Females.....	9.7	9	100	56	22	0	0	0	22	0	0	0	0	
1895.	Males.....	8.5	2	100	50	0	50	0	0	0	0	0	0	0	
	Females.....	5.2	3	100	66	0	33	0	0	0	0	0	0	0	
1896.	Males.....	2.9	13	100	77	15	8	0	0	0	0	0	0	0	
	Females.....	6.4	17	100	77	0	12	6	0	0	0	0	0	6	
1893-96.	Males.....	8.3	36	100	58	14	8	8	6	3	0	0	3	0	
	Females.....	10.1	41	100	56	10	12	2	2	7	5	0	0	5	

* On a preceding page, a foot-note to the sub-head under which this table appears, explains these age-groups.

An exhibit showing by sex and in age-groups, the death-rates from measles in Michigan, during the 25 years, 1870-94 (as reported to the Secretary of State), can be found on page 267 of the Annual Report of this Board for the year 1896.

Case-Mortality Rates from Measles at the Different Ages.

EXHIBIT—*In certain age-groups, the numbers of cases and deaths from measles in the seven years, 1890-96, and the per cent that the deaths in each group were of the cases in that group. (Compiled from all reports to the Secretary of the State Board of Health for the years, 1890-96, which stated the ages.)*

	Under 1.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.
Cases—1890-96 .	260	5,140	8,482	3,318	1,584	875	418	299	189	95	58	14	7	8	7
Deaths—1890-96	15	79	29	17	11	6	5	4	2	2	1	1	0	2	1
Per cent.....	5.8	1.5	.3	.5	.7	.7	1.2	1.3	1.1	2.1	1.7	7.1	0	25.0	14.3

TABLE 17.—*Exhibiting, by Sex, for each year of Age, and in certain Age-groups, the number of persons who died from Measles during the five years 1892-96, and the per cent the deaths in each Age-group were of deaths at all ages. (Compiled from such reports to the State Board of Health, as stated the sex and age.)*

Sex.	Ages in Years, and groups of Years.	Number and per cent of Deaths by Sex, in certain Age-periods.*																														
		All Ages.	Under 5.				5-9.				10-14.				15-19.				20-29.					30 and over.								
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		21	22	24	25	26	27	28	29
Males.	No. of Deaths, by single Years.....	-----	2	12	4	3	5	2	4	2	4	0	3	0	1	0	2	0	1	0	1	1	0	1	0	1	1	0	1	1	0	
	No. of Deaths, by Groups of Years	53	26				12				6				3				5					1								
	Per cent the Deaths in each age-group were of the total deaths † among Males.....	100	49				23				11				6				9					2								
	Average age at Death, from Measles	7.9																														
	No. of Deaths, by single Years.....	-----	5	9	9	4	3	1	1	1	3	2	4	1	3	0	1	1	0	0	1	0	0	0	1	0	0	1	0	0	1	6
Females.	No. of Deaths, by Groups of Years	58	30				8				9				2				3					6								
	Per cent the Deaths in each age-group were of the total deaths † among Females.....	100	52				14				16				3				5					10								
	Average age at Death, from Measles	10.2																														
	No. of Deaths, by single Years.....	-----	7	21	13	7	8	3	5	3	7	2	7	1	4	0	3	1	1	0	2	1	0	1	1	1	1	1	1	1	1	7
	No. of Deaths, by Groups of Years	111	56				20				15				5				8					7								
Both Sexes.	Per cent the Deaths in each age-group were of the total deaths † in both sexes.....	100	51				18				14				5				7					6								
	Average age at Death, from Measles	9.1																														

* On a preceding page, a foot-note to the sub-head under which this table appears, explains these age-groups.

† Deaths from measles.

*Average Duration of Measles.—Fatal and Non-Fatal Cases.*TABLE 18.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from Measles, in Michigan, during the years, 1892-96. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Measles.									
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Deaths in each Period of Days.						
			All cases.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.
1892.	Males.....	4	100	25.0	50.0	0	25.0	0	0
	Females.....	7	100	14.3	14.3	42.9	14.3	0	14.3
1893.	Males.....	9	100	44.4	22.2	22.2	11.1	0	0
	Females.....	11	100	9.1	27.2	27.2	18.1	9.1	0
1894.	Males.....	9	100	33.3	33.3	11.1	11.1	11.1	0
	Females.....	6	100	33.3	33.3	16.6	16.6	0	0
1895.	Males.....	1	100	0	0	0	0	100.	0
	Females.....	3	100	0	33.3	33.3	33.3	0	0
1896.	Males.....	10	100	60.0	20.0	0	20.0	0	0
	Females.....	13	100	38.5	30.8	15.4	0	15.4	0
1892-6.	Males.....	33	100	42.4	27.3	9.1	15.2	3.0	0
	Females.....	40	100	22.5	27.5	25.0	12.5	7.5	2.5

Table 18 shows that of the 33 males reported to have died from measles in the five years, 1892-6, of which the interval between the day of being taken sick and the day of death was given, 42.4 per cent died before the sixth day of sickness, and the per cent of deaths decreased in the succeeding five-day periods. Of the 40 females so reported the largest per cent (27.5) died in the second five-day period.

The average duration of fatal cases of measles in the years, 1892-6, was 9.0 days for males and 11.4 days for females.

Table 19 shows that of the 3,690 males who recovered from measles during the five years 1892-6, of which the interval between the day of being taken sick and the day of recovery was stated, 57 per cent recovered before the eleventh day of sickness, 85.9 per cent recovered before the sixteenth day of sickness. Of the 3,680 females so reported, 58.1 per cent recovered before the eleventh day of sickness, 86.3 per cent before the sixteenth day of sickness.

The average duration of non-fatal cases of measles in the years 1892-6, was 11.1 days for males and 11.0 days for females.

TABLE 19.—*Exhibiting, by Sex of patient, by per cent of cases which recovered in specified periods of time, the Duration (in days) of Non-Fatal cases of sickness from Measles, in Michigan, during the years, 1892-96. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Measles.															
Year.	Sex.	No. of cases in- cluded.	Duration of Sickness:—Per Cent of Cases in each Period of Days.												
			All Peri- ods.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1892.	Males.....	259	100	6.6	59.8	18.9	10.8	1.5	1.2	.8	0	.4	0	0	0
	Females.....	259	100	8.1	56.0	15.8	14.3	2.7	1.6	.8	.4	0	.4	0	0
1893.	Males.....	620	100	12.1	45.0	25.3	9.7	3.5	1.6	1.0	1.0	.2	.2	.3	.3
	Females.....	654	100	13.9	49.7	22.2	7.5	2.8	1.9	.2	.9	.3	.5	0	.2
1894.	Males.....	823	100	5.0	46.8	23.6	17.4	4.9	.6	.4	.4	.2	.2	.2	.4
	Females.....	771	100	7.1	45.4	24.9	16.6	4.4	.3	.7	0	.1	.5	0	0
1895.	Males.....	333	100	9.8	49.4	26.3	7.4	3.3	.9	.3	1.8	.6	.3	0	0
	Females.....	321	100	8.7	51.4	26.8	6.5	4.4	.9	.3	.6	.3	0	0	0
1896.	Males.....	1,650	100	6.5	51.3	35.0	4.7	1.6	.7	.1	.1	0	0	0	0
	Females.....	1,675	100	7.4	49.8	34.1	5.3	2.0	.9	.3	.1	0	0	.1	0
1892-96.	Males.....	3,690	100	7.4	49.6	28.9	9.1	2.8	.9	.4	.5	.2	.1	.1	.1
	Females.....	3,680	100	8.7	49.4	28.2	8.8	2.9	1.0	.4	.3	.1	.2	.03	.03

Proportion of Measles in the Different Months of the Year 1896.

Table 20 exhibits evidence, from two sources, on the proportion of measles reported in each month of the year 1896, namely the sickness statistics and the contagious-disease statistics. The *first* line states the per cent of all weekly postal-card reports, made by physicians in active general practice, which reported the presence of measles under their observation. The *second* line states the average per cent of all these reporters who stated the presence of measles. The *third* line states the average order of prevalence of measles in the list of diseases reported. The *fourth* line represents the *prevalence* of measles, according to the sickness statistics, being a combination of the first and third lines of this table (the method of combining them is explained on pages 122-3 of the Annual Report of

this Board for the year 1890). In this fourth line the smallest numbers indicate the greatest prevalence,—for instance, May is 1 or *first* in prevalence,—more measles in May than in any other month; June is 2 or *second* in prevalence; October is 3 or *third* in prevalence; and so on. The *fifth* line represents by months the number of outbreaks of measles reported to this Office by health officers and clerks, including only the reports which gave the dates of outbreaks,—reports of 50 outbreaks did not give dates and, of course, those outbreaks could not be included in this line.

The evidence of the sickness statistics, summarized in the fourth line of this table (20) indicates that the maximum prevalence of measles in Michigan in 1896 occurred in May, and the minimum in August. The fifth line of the table, which is based on the contagious-disease statistics, indicates that the maximum number of reported outbreaks occurred in May and the minimum in September. This evidence is only for a single year, and might, therefore, be exceptional. In Exhibit XX., page 139, of this Annual Report for 1897, is a statement of the average per cent of weekly card reports stating the presence of measles by months for the nineteen years, 1877-95, from which it appears that the maximum occurs in May, and the minimum alike in September and October.

TABLE 20.—*Measles in Michigan during the year 1896, exhibiting, by months, the per cent of all weekly card-reports received which stated the presence of measles; the average per cent of all observers reporting weekly who reported measles; the average order of prevalence of measles where it was present; the prevalence of measles, according to the sickness statistics, and the number of outbreaks of measles reported by health officers and clerks of local boards of health.*

1896.	Year	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Per cent of weekly card reports stating presence of measles	7	2	7	11	10	17	14	9	2	1	2	3	4
Average per cent of observers who reported measles present.....	12	5	13	17	16	25	22	19	6	4	2	9	6
Average order of prevalence where present.....	2.7	2.8	3.4	4.4	3.8	1.9	1.6	2.7	3.4	2.3	1.0	2.5	2.0
Prevalence*.....	(6)	11	9	6	7	1	2	4	12	10	3	8	5
Outbreaks†.....	355	21	26	33	43	56	49	28	12	5	14	32	36

* According to the sickness statistics, as explained in the text accompanying this table. In the fourth line of figures in this table, the smallest numbers indicate the greatest prevalence.

† The numbers in this line show the numbers of outbreaks which *began* in each month. There were 50 reported outbreaks in this year the dates of which were not given.

CONSUMPTION IN MICHIGAN—YEAR ENDING DECEMBER 31, 1896.

During the year ending December 31, 1896, there were reported to the Secretary of the State Board of Health 2,198 cases and 1,454 deaths from consumption in Michigan. These reports were received from 512 localities in the State. This is probably less than the actual number of consumption-infected localities in Michigan, much less than the actual number of deaths, and very much less than the actual number of cases. Many cases are of long duration, and in the early stages and sometimes in the latest stages are not under the care of a physician, as a consequence many of these cases are not reported. From many localities only the deaths from consumption are reported; therefore the apparent ratio of deaths to cases is much too high.

For the year 1896 there were reported to the Secretary of State 2,093 deaths from consumption, or 639 more than were reported to this Office. The Secretary of the State Board of Health has estimated that the deaths returned to the Secretary of State should be increased by forty per cent to make them equal the number which actually occur.*

CONSUMPTION IN 1896, COMPARED WITH PREVIOUS YEARS.

According to the reports made to the Secretary of the State Board of Health.

The compilation of information relative to the prevalence of consumption in Michigan, as reported to the Office of the Secretary of the State Board of Health, was made for the first time for the year 1893. Table 1 shows the reported numbers of cases and deaths from consumption, the number of localities where the disease was reported present, the average numbers of cases and deaths per locality, and the deaths per 100 cases, for the years 1893-96. There were more localities, cases and deaths reported in 1895 than in 1893 or in 1894. In 1896 the number of infected localities was less than in any of the previous three years, but there was an increase in the number of *cases* reported, this gives an increase in the average number of cases per locality and shows that a larger proportion of the non-fatal cases of consumption are being reported. The number of deaths from consumption reported in 1896 was less than in any of the previous three years; the ratio of deaths to cases was considerably lower in 1896 than in the previous three years for the reasons given above—increased number of cases and decreased number of deaths.

* According to this estimate, there were 2,930 deaths from consumption in Michigan in 1896.

TABLE 1.—CONSUMPTION IN MICHIGAN.—Numbers of reported cases and deaths, Number of Localities in which they occurred, Average number of cases and deaths per locality, and the per cent of cases which proved fatal, as reported for each of the four years, 1893-96.

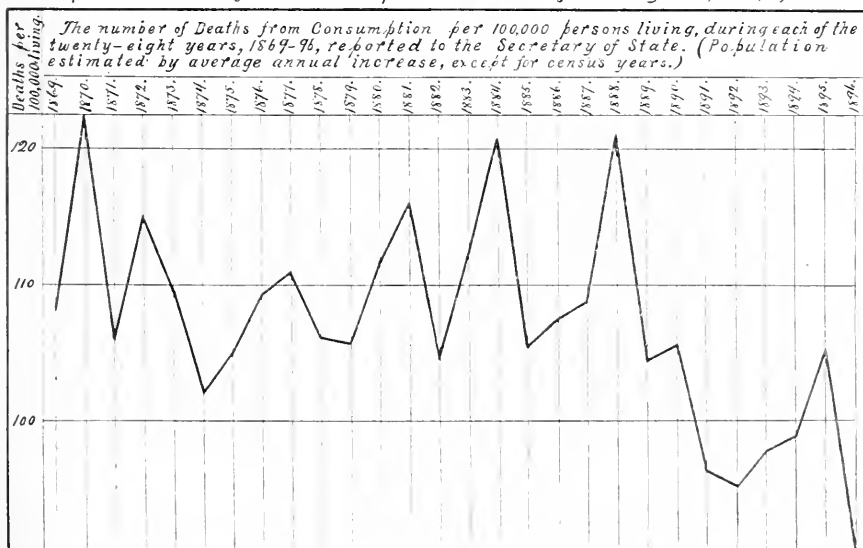
Year.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases.
1893.....	525	1,988	3.8	1,509	2.9	75.9
1894.....	560	2,060	3.5	1,551	2.7	76.7
1895.....	626	2,068	3.3	1,613	2.6	78.0
1896.....	512	2,195	4.3	1,454	2.8	66.2

According to the reports made to the Secretary of State.

The reports to the Secretary of the State Board of Health, while useful for many purposes, are not yet useful for comparing the deaths in one year with the deaths in another year, for the reasons already stated. On the other hand, not all deaths are reported to the Secretary of State, but probably the omissions are about the same in every year, therefore the statistics of the State Department are useful for comparing one year with another.

The accompanying diagram (Plate 937) graphically represents the figures contained in Table 2.

Reported Deaths from Consumption in Michigan, 28 years, 1869-96.



The following table (2) stating the number of deaths from consumption per 100,000 persons living, reported to the Secretary of State, probably quite accurately represents the annual fluctuations of, but not the total deaths from consumption in Michigan during the 28 years, 1869-96.

TABLE 2.—*Exhibiting the number of reported deaths from Consumption per 100,000 persons living in Michigan in each of the 28 years, 1869-96. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population for intercensal years estimated by average annual increase based on National and State censuses.)*

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
Deaths.....	108.1	122.5	106.0	115.1	109.6	102.0	104.9	109.2	110.9	106.1	105.6	111.7	116.1	104.4
Year.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths.....	112.3	120.8	105.3	107.3	108.7	121.0	104.3	105.4	96.3	95.2	97.7	98.4	105.1	90.4

By Table 2, and more readily by the diagram—plate 937—it may be seen that there was a marked decrease in the death-rate from consumption in 1889 as compared with the previous year, this was followed by a slight rise in 1890. In 1891 there was another decided decrease in the death-rate from consumption in Michigan. The first-mentioned decrease may be only the usual inter-epidemic period. The second one is remarkable as it was the first time that the disease had ever decreased so much, and it occurred at a time when influenza was epidemic in this country, and the statistics for the eastern States show an increase in the death-rate from consumption, which increase was attributed to the influence of the epidemic influenza.

It is possible that the decrease in the death-rate from consumption in Michigan beginning in 1891 and continuing in 1892-3-4 was due to the efforts of the State Board of Health to educate the people in methods of restricting the disease. Those efforts are mentioned on page 426, Annual Report of this Board for 1895. Alternative suppositions are (1) that the decrease in the death-rate from consumption was caused by the attributing of a large number of deaths of consumptives to influenza, in the years 1891-2-3-4, and (2) that many who otherwise would have died from consumption in those years actually died from influenza in 1891. Possibly all three of these supposed causes may have contributed. But it is a fact that the first edition of the leaflet on the restriction and prevention of consumption was widely distributed throughout Michigan in 1891, and that year was the first one in which the reported death-rate from consumption was less than 100 per 100,000 persons living; it is also a fact that in no year since 1890 has the reported death-rate from consumption equaled the average death-rate previous to that year; and in 1896 the reported death-rate from consumption was less than it was ever known to be in Michigan.

It now appears probable that the material lessening of the mortality from this disease which has heretofore caused most deaths has at last fairly commenced.

Table 3 exhibits, by divisions of the State, the distribution of consumption in 1896, reported to the Secretary of the State Board of Health. Table 4 and the accompanying map exhibit, in slightly different ways, the reported consumption during the year 1896, by counties. The tables exhibit the death-rates as well as the reported cases and deaths.

DISTRIBUTION OF CONSUMPTION BY DIVISIONS AND COUNTIES DURING 1896.

TABLE 3.—*Exhibiting the Population of Michigan for the year 1896, by tiers of counties (Upper Peninsula as one tier); also the number of cases of and deaths from Consumption REPORTED to the State Board of Health from each of these divisions for 1896, and the number of cases and deaths per 10,000 population of each division.*

Counties in Groups, most Northern ones First.			Estimated Population 1896.*	Reported Cases of Consumption, 1896.	Average Reported Cases per 10,000 Population.	Reported Deaths from Consumption, 1896.	Reported Deaths from Consumption per 10,000 Population.
State			2,315,517	2,195	9.49	1,454	6.28
Upper Peninsula	Alger.	Mackinac.	219,561	119	5.42	75	3.42
	Delta.	Chippewa.					
	Schoolcraft.	Keweenaw.					
	Luce.	Marquette.					
	Houghton.	Iron.					
Eleventh tier of counties	Ontonagon.	Menominee.	44,907	52	11.58	42	9.35
	Gogebic.	Dickinson.					
	Baraga.	Cheboygan.					
	Charlevoix.	Presque Isle.					
	Leelanaw.						
Tenth tier of counties	Antrim.	Alpena.	50,469	35	6.94	24	4.76
	Otsego.						
	Montmorency.						
	Benzie.	Crawford.					
	G'd Traverse.	Oscoda.					
Ninth tier of counties	Kalkaska.	Alcona.	44,715	30	6.71	21	4.70
	Manistee.						
	Wexford.	Ogemaw.					
	Missaukee.	Iosco.					
	Roscommon.						
Eighth tier of counties	Mason.	Gladwin.	68,430	35	5.11	22	3.21
	Lake.	Bay.					
	Osceola.	Huron.					
	Clare.	Arenac.					
Seventh tier of counties	Oceana.		161,297	122	7.56	107	6.63
	Newaygo.						
	Mecosta.	Midland.					
	Isabella.						
Sixth tier of counties	Muskegon.		94,010	49	5.21	34	3.62
	Montcalm.	Tuscola.					
	Gratiot.	Sanilac.					
	Saginaw.						
Fifth tier of counties	Ottawa.	Shiawassee.	251,350	136	5.41	97	3.86
	Kent.	Genesee.					
	Ionia.	Lapeer.					
	Clinton.	St. Clair.					
Fourth tier of counties	Allegan.	Livingston.	359,922	313	8.03	269	6.89
	Barry.	Oakland.					
	Eaton.	Macomb.					
	Ingham.						
Third tier of counties	Van Buren.		232,834	149	6.40	84	3.61
	Kalamazoo.	Washtenaw.					
	Calhoun.	Wayne.					
	Jackson.						
Second tier of counties	Berrien.	Hillsdale.	525,805	973	18.50	561	10.67
	Cass.	Lenawee.					
	St. Joseph.	Monroe.					
	Branch.						
First tier of counties			232,233	185	7.97	118	5.08

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the office of the State Board of Health.

TABLE 4.—Numbers of Cases and Deaths reported from **Consumption** per 10,000 persons living in each county in Michigan during the year 1896. (Compiled from reports of health officers, clerks, etc.)

Counties.	Estimated population for 1896.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated population for 1896.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,315,517	2,198	1,454	9.49	6.28	Keweenaw ...	2,693	2	2	7.43	7.43
Alcona	5,423	5	4	9.22	7.38	Lake	5,593	4	2	7.15	3.58
Alger	1,459	2	2	13.71	13.71	Lapeer	28,712	15	9	5.22	3.13
Allegan	39,303	17	14	4.33	3.56	Leelanau	10,281	8	8	7.78	7.78
Alpena	18,785	18	9	9.58	4.79	Lenawee	48,588	30	19	6.17	3.91
Antrim	13,434	7	6	5.21	4.47	Livingston	20,227	12	9	5.93	4.45
Arenac	7,573	6	6	7.92	7.92	Luce	2,294	0	0	0	0
Baraga	4,890	2	1	4.14	2.07	Mackinac	6,941	5	3	7.20	4.32
Barry	23,657	16	9	6.76	3.80	Macomb	32,674	14	12	4.28	3.67
Bay	63,750	84	75	13.18	11.76	Manistee	27,056	12	2	4.44	.74
Benzie	9,476	7	4	7.39	4.22	Marquette	38,972	24	23	6.16	5.90
Berrien	47,810	60	31	12.55	6.48	Mason	19,440	4	3	2.06	1.54
Branch	25,913	24	22	9.26	8.49	Mecosta	21,245	13	10	6.12	4.71
Calhoun	49,458	31	26	6.27	5.26	Menominee	24,345	6	1	2.46	.41
Cass	21,288	19	13	8.93	6.11	Midland	14,499	9	6	6.21	4.14
Charlevoix	11,702	6	4	5.13	3.42	Missaukee	7,909	7	7	8.85	8.85
Cheboygan	14,837	31	30	20.87	20.19	Monroe	33,603	15	7	4.45	2.08
Chippewa	16,974	23	5	13.55	2.95	Montcalm	34,919	25	17	7.16	-----
Clare	8,185	4	4	4.89	4.89	Montmorency	2,914	0	0	0	0
Clinton	26,139	23	23	8.80	8.80	Muskegon	35,980	25	13	6.95	3.62
Crawford	2,564	2	2	7.74	7.74	Newaygo	18,449	5	4	2.71	2.17
Delta	21,228	10	7	4.71	3.20	Oakland	43,392	38	19	8.76	4.38
Dickinson	15,074	4	3	2.65	1.99	Oceana	17,050	12	7	7.04	4.11
Eaton	22,880	31	12	9.43	3.65	Ogemaw	5,666	2	2	3.53	3.53
Emmet	11,825	14	7	11.84	5.92	Ontonagon	8,432	5	4	5.93	4.74
Genesee	41,115	44	33	10.70	8.03	Osceola	17,398	11	9	6.32	5.17
Gladwin	5,246	0	0	0	0	Oscoda	1,757	1	1	5.69	5.69
Goebic	14,542	6	4	4.13	2.75	Otsego	5,055	2	1	3.96	1.98
G'd Traverse	19,595	8	5	4.09	2.55	Ottawa	40,946	17	14	4.15	3.42
Gratiot	28,830	25	19	8.67	6.59	Presque Isle	6,523	1	1	1.53	1.53
Hillsdale	30,078	20	13	6.65	4.32	Roscommon	1,469	0	0	0	0
Houghton	48,568	24	16	4.94	3.29	Saginaw	81,634	34	33	4.16	4.04
Huron	34,112	9	8	2.64	2.35	Sanilac	34,623	13	6	3.75	1.73
Ingham	40,701	21	9	5.16	2.21	Schoolcraft	7,782	1	1	1.29	1.29
Ionia	35,830	14	10	3.91	2.79	Shiawassee	33,805	18	12	5.32	3.55
Iosco	10,898	3	2	2.75	1.84	St. Clair	55,429	42	33	7.58	5.95
Iron	5,427	5	3	9.21	5.53	St. Joseph	24,953	17	13	6.81	5.21
Isabella	22,767	10	7	4.39	3.07	Tuscola	35,364	14	9	3.96	2.54
Jackson	47,287	11	9	2.33	1.90	Van Buren	31,318	23	23	7.34	7.34
Kalamazoo	43,448	65	58	14.96	13.35	Washtenaw	44,159	9	6	2.04	1.36
Kalkaska	5,880	7	5	11.90	8.50	Wayne	310,135	834	439	26.89	14.16
Kent	127,946	140	135	10.94	10.55	Wexford	15,432	11	9	7.13	5.83

* Population estimated by average annual increase (arithmetical method) based on U. S. Census of 1890 and the State Census of 1894. Computed in the Office of the State Board of Health.

Sickness-rates from reported Consumption in 1896.

Table 3 exhibits the latitudinal distribution of the reported consumption throughout the State, by tiers of counties; all the counties of the Upper Peninsula considered as one tier. By this table (3), it appears that the lowest sickness-rate (5.11 per 10,000 of population) was in the eighth tier, the sixth tier was next in lowest sickness-rate. The tier of counties having the greatest sickness-rate (18.50 per 10,000 population) was the second.

The sickness-rate in the eleventh tier also was above the average rate for the State.

Table 4 shows by counties the sickness-rates in the State. The greatest sickness-rate from reported consumption in 1896 was in Wayne county, where the ratio of cases to population was 26.89 to 10,000. Other counties where the sickness-rates were largely in excess of the average rate for the State, were: Cheboygan, 20.87; Kalamazoo, 14.96; Alger, 13.71; Chippewa, 13.55; Bay, 13.18, and Berrien, 12.55 cases per 10,000 population. The lowest sickness-rate from reported consumption (where such sickness occurred) for the year, 1.29 cases per 10,000 population, was in Schoolcraft county. Other counties whose sickness-rates were much below the average for the State, were: Presque Isle, 1.53; Washtenaw, 2.04; Mason, 2.06, and Jackson, 2.33 cases per 10,000 of population.

Death-rates from reported Consumption in 1896.

The tier of counties having the greatest death-rate was the second, with 10.67 deaths per 10,000 of population.

By counties, the greatest reported death-rate from this disease during the year, 20.19 deaths per 10,000 of population, was in Cheboygan county. Other counties where the death-rates were much above the average death-rate for the State, were: Wayne, 14.16; Alger, 13.71; and Kalamazoo, 13.35 deaths per 10,000 of population. The lowest death-rate (where death occurred), .41 of one death per 10,000 of population, was in Menominee county. Other counties where the death-rates were below the average death-rate for the State, were: Manistee, .74; Schoolcraft, 1.29; and Washtenaw, 1.36 deaths per 10,000 of population.

From the following four counties: Gladwin, Luce, Montmorency and Roscommon,—having an aggregate population of 11,923, no consumption was reported during the year.

The proportionate fatality from consumption in 1896, *i. e.*, the proportion of reported cases which proved fatal, was, for the whole State, 66.2 per cent, or about 2 deaths to every 3 cases reported. From the following thirteen counties: Alger, Arenac, Clare, Clinton, Crawford, Keweenaw, Leelanaw, Missaukee, Ogemaw, Oscoda, Presque Isle, Schoolcraft, and Van Buren, only the fatal cases were reported. In Wayne county in 1895 the fatal cases were 97.1 per cent of all reported cases; in 1896 the fatal cases were only 52.6 per cent of all reported cases from that county, which shows that an effort was made by the health officials of Wayne county to make more satisfactory returns of the non-fatal cases of consumption. In Kent county in 1896 the fatal cases were 96 per cent of the total reported cases from that county. The minimum fatality (16.6 per cent of the reported cases) occurred alike in Manistee and Menominee counties.

TABLE 5.—*Exhibiting, by Months, the number of deaths from Consumption that were reported to have occurred in Michigan in the three years, 1894-96. (Compiled from such reports to the State Board of Health, as stated the time of death.)*

Year.	Total Number.	Number of deaths for each month.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1894.....	453	32	28	33	41	45	40	36	33	35	37	41	52
1895.....	513	42	41	45	39	43	34	33	44	40	38	55	59
1896.....	865	74	67	42	95	97	66	67	74	52	68	79	84

Source of Contagium of Consumption.

Of the 2,198 cases of consumption reported, during the year 1896, as exhibited in Table 6, the local health officers reported the source of contagium as follows: Traced to a former case, 16; reported as inherited, 96; attributed to "taking cold" or "exposure," 36; attributed to "La Grippe," 18; attributed to contagium from outside of jurisdiction, 16; unknown or indefinitely reported, 595; source not reported, 1,421; total, 2,198.

TABLE 6.—*Reported Source of Contagium of Consumption in 1896.*

Source.	Numbers of cases.
Cases reported as traced to a former case.....	16
Cases reported as inherited.....	96
Cases attributed to "taking cold" or "exposure".....	36
Cases attributed to "La Grippe".....	18
Cases attributed to contagium from outside of jurisdiction.....	16
Cases, the sources of contagium of which were reported as unknown, or the statements were too indefinite for classification.....	595
Cases, the sources of contagium of which were not reported.....	1,421
All cases.....	2,198

How Consumption is Spread.

The tubercle bacillus, the specific cause of consumption, is found in the sputa of persons suffering from that disease in an active state in the lungs. The dust of dried tubercular sputum when inhaled by susceptible persons is thought to be the most common way of transmitting pulmonary consumption from person to person. Members of a family, in which there is a consumptive, are constantly exposed to the danger of infection unless the sputa are collected and destroyed. The object of much work done by the State Board of Health is to educate the people in this simple means for restricting the spread of consumption.

On following pages is given correspondence between local health officers and this Office bearing on the subject of consumption:—

Should a consumptive person be allowed to teach school?

J. E. Wilson, M. D., of Rochester village, Oakland county, wrote to the Secretary of this Board, June 8, 1896, relative to the advisability of retaining a consumptive as teacher in the village schools, as follows:—

"The school board of Rochester wished me to submit to you as Secretary of the Board of Health the following inquiry:—

"One of our teachers here developed incipient phthisis pulmonalis, would it be safe or prudent to continue her in our schools? Some of the fathers are finding fault. An early answer will greatly oblige them."

In answer to the above-quoted letter, the Secretary of this Board wrote Dr. Wilson, June 9, as follows:—

"Your letter of June 8 relative to a teacher in the public schools having consumption and whether it would be prudent to continue her in your schools, is before me, for which please accept thanks. It seems to me that he or she may move freely in private and in public without danger of spreading the disease. But in order that this may be done, it is essential that the consumptive person have complete knowledge of the methods by which consumption is spread, and by which it is restricted. And he or she must have a conscientious determination that the specific cause of the disease shall be promptly destroyed, and not permitted to endanger the life of another person. If the teacher you refer to is conscientious in carrying out the recommendations of this Board as printed in the pamphlet bearing upon the restriction and prevention of consumption, I think that she could safely continue in school. However I think you and your board of health are in a better position to determine the question, than I am, and I trust that you will do what is best for the safety of the public health."

Disinfection of premises after the death or removal of a consumptive.

Dr. A. Kline Thiell, of Marquette, wrote to the Secretary of this Board, March 24, 1896, requesting information relative to the disinfection of premises after the death of a consumptive, as follows:—

"As our health officer, Doctor Harkin, is out of the city, I take the liberty of addressing you upon the following subject directly, instead of through him. Will you kindly advise me what steps it will be necessary to take in order to thoroughly disinfect, and render perfectly safe, a house in which a case of pulmonary tuberculosis has been living for the last six months, and in which the case recently died. The house is a new one with hard wood finishings, and has been recently papered and oiled. As it is for my own use, I want to exercise all possible precaution before moving into it. Any measures, no matter how extreme, will be taken, and knowing no higher authority upon the subject than yourself, I apply to you for information. I would esteem it a great favor if you could reply promptly, and in such form that it would be of use to our health officer in case of like character in the future."

In the absence of the Secretary the above-quoted letter was answered by the Chief Clerk, March 26, 1896, as follows:—

"Your letter of March 24, relative to disinfection of a house recently occupied by a consumptive person, is received during Doctor Baker's absence from the office for a few days. I will endeavor to answer your question; but, when Doctor Baker returns, I will place your letter and my reply before him for any further attention he may deem wise.

"I send you by this mail several leaflets of the office, especially one relating to the restriction and prevention of consumption, in which you will find parts marked bearing upon your letter.

"For the disinfection of rooms this Board recommends the burning of sulphur at the rate of three pounds of sulphur to each one thousand cubic feet of air-space. It would be well to subject the house to sulphur fumes for from twelve to twenty-four hours, and then for several hours it should be exposed to currents of fresh air. The floors might be washed with a 1 to 500 corrosive sublimate solution. The

same solution might be applied to the wood work and the walls, if practicable. It would be well to try the solution on the wood work and see how it will affect the varnish. It is possible that it might spoil the varnish, especially if the varnish was cheap. It is most important to wash the floors, which are most liable to contain the bacilli.

"If the walls have been papered since or while the house was occupied by the consumptive it is probable that disinfection will not be complete, unless that paper is removed. The dust containing the bacilli would have settled on the walls, to be covered by the paper.

"In preparing the room for the sulphur disinfection, every opening should be closed, etc., as per page 3 of the leaflet on consumption. Because of the law of the diffusion of gases, and the numerous crevices through which sulphur fumes may pass, sufficiently strong fumes do not remain in the room long enough, unless the combustion is somewhat rapid and continues for a considerable time."

Should Chronic Bronchitis be Reported and Treated as Incipient Consumption?

F. L. Tupper, M. D., health officer of West Bay City, wrote to the Secretary of this Board, June 29, 1896, relative to a case of consumption in which the diagnosis had been changed to bronchitis, as follows:—

"In April I reported a case of consumption which was reported to me by one of our physicians, and the same case being reported to me as having died, I called up said physician today, asking for some information regarding the case, and he has changed his opinion regarding the case, saying that he considered it one of *bronchitis*.

"Shall I report facts or not? If so send me a blank."

In answer to the above-quoted inquiry from Dr. Tupper, the Secretary of this Board wrote, July 1, 1896, as follows:—

"Relative to the case of consumption being a case of bronchitis, if it *certainly* is one of bronchitis, no reports to this office are now required." [But, although bronchitis has never been required to be reported, an eminent physician in New York has stated that in a large proportion of cases of chronic bronchitis the bacillus tuberculosis is found in the sputa. H. B. B., Sec. State Bd. of Health.]

In cases of chronic bronchitis with expectoration it would be safer to destroy the sputa the same as in a case of tuberculosis pulmonalis until repeated examinations of the sputa have failed to show any tubercle bacilli; physicians as well as patients and their friends are loath to call the case consumption.

Cases of consumption following typhoid fever.

A. B. Conklin, M. D., health officer of Cassopolis village, Cass county, wrote to the Secretary of this Board, Dec. 14, 1896, as follows:—

"The case of consumption, now existing in Cassopolis village, is interesting in this particular, in that I think it came from the lad doing chores, emptying slops, etc., for the patient upon whose case I herewith submit my final report.

"The present case is a boy of ten years, of a family free from a history of tuberculosis, and he came down with typhoid fever while waiting upon the family in which the first case died. He had a run of about four weeks of typhoid well marked, including the rose colored rash and when that left him he was found to have lung complications, and a hectic condition was soon set up; he is running down rapidly.

"No microscopical examination of sputa has been made, but will be."

Relative to a case of consumption which followed soon after recovery from an attack of typhoid fever in the same patient, "The Sault Ste. Marie News" of April 4, 1896, contained the following:—

"In 1894 the patient's health failed and he was forced to resign his position. After leaving Judge C-l's office he overdid himself in a wheeling tour through the Upper Peninsula and Canada. Shortly afterward he was stricken with typhoid fever, from which he recovered. Later he was attacked by the disease which proved so fatal."

Suspected tubercular infection from milk.

G. W. Fralick, M. D., health officer of township of Kasson, Leelanaw county, wrote to the Secretary of this Board, May 22, 1896, relative to the suspected infection with tuberculosis of the members of a family, from the use of milk, as follows:—

"I have a family which is showing symptoms of tuberculosis. The family history is good and (if my diagnosis be correct) I am unable to trace the source of the infection, unless it be through the milk. They consume a large amount of milk. Can you give me any information to assist me?"

The Secretary of this Board replied to the above-quoted letter, May 25, 1896, as follows:—

"Replying to your letter of May 22, I should be glad to know more about the cases of suspected tuberculosis. Do the patients cough and raise? Are their sputa of such nature as to lead you to suspect tuberculosis? If so, you could secure an examination of a sample at the State Laboratory of Hygiene, at Ann Arbor, for about cost, which I think is \$5 00 per sample. Before sending sample, you should correspond with the director (Doctor Victor C. Vaughan) who has certain instructions.

"Then again you might examine the cattle, and see if there is manifest or suspected tuberculosis. You might use the tuberculin test on the cattle, which is nearly a certain test, if used in the hands of those who understand how. Perhaps you may know of some competent veterinarian, if you are not able to use tuberculin. I think you might be able to secure some tuberculin, by corresponding with Dr. D. E. Salmon, chief of Bureau of Animal Industry, Washington, D. C. If the udder of the cow is affected, it is probable that the milk is infected.

"I shall be glad to hear from you further with regard to this outbreak."

Suspected tubercular infection from a diseased cow.

F. R. Blanchard, M. D., health officer of Lakeview village, Montcalm county, wrote to the Secretary of this Board, May 12, 1895, relative to suspected tubercular infection from the use of milk, as follows:—

"This case of consumption which I report I have not seen for a long time. I treated her myself a year ago for bowel trouble and I suspected tuberculosis then, but she got better and assured me that she had not been so well for years; last fall she began to have trouble in her throat and upon examination I found she had pharyngitis with enlargement of pharyngeal glands. * * * At that time I examined her lungs and found her bronchial tubes inflamed. She then changed physicians. * * * I understand that he has assured them all along that there was no lung trouble. But May 1, '96, I talked with her father and am convinced that she has pulmonary consumption, and is now very low. I gave her father instructions as to means of preventing the spread to other members of the family. Now comes the interesting part of the case. I find that last summer, fall and winter she used milk from a Jersey cow. Early this spring the cow showed evidence of disease, and finally became so bad that the owner killed it; none of the local cow doctors were able to diagnose the trouble, and they wrote to the State Veterinary Surgeon; his diagnosis was either tuberculosis or lumpy jaw. I did not see the cow but understand that they found her lungs full of tubercular masses after death. Now I have said nothing of this to the people interested as it would only create a lifelong regret, but I am convinced that is the source of the infection."

In writing to this Office again on May 18, Dr. Blanchard stated relative to the subject mentioned above, as follows:—

"In regard to the milk—it was used by the rest of the family, viz., her husband and a young man boarder, they are both in good health with no indication of any tubercular trouble."

From the foregoing reports, showing the occurrence of cases of tuberculosis following typhoid fever or some other disease in which the bowel is involved, we are led to believe that there may be some relation between these diseases. When the bowel is ulcerated as in typhoid fever the chance for infection from the food is probably increased. The diet of typhoid fever patients is usually restricted to milk; great care should therefore, be taken to secure milk from healthy animals for patients with lesions of the bowel.

State Laboratory of Hygiene should be used by country practitioners in the diagnosis of consumption, etc.

G. W. Chrouch, M. D., health officer of Woodhull township, Shiawassee county, wrote to the Secretary of this Board, Dec. 8, 1896, relative to the difficulty of country practitioners in diagnosing consumption in the early stages and asking whether the State Laboratory of Hygiene could be utilized for such purposes. Dr. Chrouch's letter was as follows:—

"Your recent circular relating to consumption is received. One of the cases mentioned to you last January is dead. A second case will soon die. A third, a recent arrival from Indiana, claims he is not a consumptive; but I shall think him such, till I am better able to judge. * * * How are we to be judges, in a country practice and without laboratory facilities? We cannot with certainty take outward symptoms. Is there no way by which we can be sure of a diagnosis early? Absolute safety requires an early diagnosis. Can we make use of the State Laboratory, at the University? Local boards, in small townships, cannot be expected to be possessed of the necessary apparatus, either to determine the presence of bacilli in sputum, or the other route—serum therapy. Write me please, and make duty appear more plain.

"The cases, suspects included, are watched and care necessary to protect others ordered."

In answering the above-quoted letter, the Secretary of this Board wrote, Dec. 9, 1896, as follows:—

"As to the early diagnosis of consumption, I agree with you that it is essential so far as the treatment is concerned, but as regards the danger to the public health I do not consider it so essential, for the reason that the danger to the public health increases with the advancement of the disease; not much danger unless bacilli are being expectorated.

"For the convenience of physicians, in the diagnosis of consumption, arrangement has been made with Prof. Victor C. Vaughan, of Ann Arbor, to make bacteriological examination of the sputa in suspected cases."

*Ages of Greatest Prevalence of, and Mortality from, Consumption.**

In Table 7 are shown the numbers of cases and deaths from Consumption in Michigan in 1896, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in principal groups were of all deaths.

* In compiling data relative to ages, used in tables in this article each age-period begins and ends on the birthday. For arranging the ages by single years or in age-periods the following methods is pursued:—From birth to one year old is the *first* year. Those one year old and less than two years old are classed in the second year. The third year of age includes all persons over two years and less than three years of age, and so on for each succeeding year.

In dividing the ages into five year periods, the first period includes all ages from birth to five years, or all *under* five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.

TABLE 7.—*Exhibiting in certain Age-groups, the number of cases and the number of deaths from Consumption; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in each group were of the cases in that group.—Compiled from all reports for the year 1896 which stated the ages.*

	Number and per cent of Cases and Deaths in certain Age-groups.*															
Ages in groups of years.	All known ages.	Under 10 Years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.	70 to 74.	75 years and over.
No of cases	†366	4	11	42	67	55	50	45	25	20	12	11	11	8	4	1
Per cent the cases in each group were of all cases of known ages..	100	1.1	3.0	11.5	18.3	15.0	13.7	12.3	6.8	5.5	3.3	3.0	3.0	2.2	1.1	.3
No. of deaths	†203	4	10	32	56	48	42	47	22	12	9	11	8	7	4	1
Per cent the deaths in each group were of cases in that group...	82.8	100	90.9	76.2	83.6	87.3	84.0	82.2	88.0	60.0	75.0	100	72.7	87.5	100	100
Per cent the deaths in each group were of all deaths at known ages.	100	1.3	3.3	10.6	18.5	15.8	13.9	12.2	7.3	4.0	3.0	3.6	2.6	2.3	1.3	.3
Per cent the deaths in special groups were of all deaths at known ages.....		4.6		44.9			33.3			17.2						

* Method of grouping is stated in foot-note to the sub-head under which this table appears.

† Does not include those cases or deaths where the age was not stated.

TABLE 8.—*Exhibiting, by Sex, the Ages of 844 persons who died of Consumption, during the years 1894-6. (Compiled from such reports to the State Board of Health, as stated Sex and Age.)**

Year.	1894.			1895.			1896.		
	Males.	Females.	Totals.	Males.	Females.	Totals.	Males.	Females.	Totals.
10 years and under	5	2	7	1	7	8	3	1	4
10 to 20 years	14	39	53	13	26	39	10	32	42
20 to 30 "	33	44	77	29	56	85	36	68	104
30 to 40 "	20	31	51	27	44	71	32	47	79
40 to 50 "	13	12	25	13	24	37	10	24	34
50 to 60 "	8	6	14	9	10	19	10	10	20
60 to 70 "	6	14	20	7	9	16	5	10	15
70 to 80 "	3	3	6	3	7	10	4	1	5
Over 80 "	2	0	2	1	0	1	0	0	0
	104	151	255	103	183	286	110	193	303

* The method of grouping ages for 1894 was slightly different from that employed for 1895, but as the difference would affect principally the first age-period (which included all ages from birth to five years and six months of age) and the occurrence of consumption at this age is not great, the material for 1894 will be placed in the tables under the new grouping of ages for 1895. An explanatory footnote is on the same page as the sub-head under which this table appears.

TABLE 9.—*Exhibiting, by Sex and in certain Age-groups, the per cent of persons who died from Consumption in Michigan, during the years, 1894-6; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from Consumption.													
Year.	Sex.	Average age, Years.	No. of Deaths included.	Ages.—In Periods of Years. Per Cent of Deaths in each Period of Age.*									
				All ages.	Under ten Years.	10 to 19.	20 to 29.	30 to 39.	40 to 49.	50 to 59.	60 to 69.	70 to 79.	Over 80 years.
1891.	Males	34.7	104	100	5	13	32	19	13	8	6	3	2
	Females	32.7	151	100	1	26	29	21	8	4	9	2	0
1895.	Males.....	36.2	103	100	1	9	30	27	13	10	7	3	1
	Females.....	33.4	153	100	4	10	34	24	13	6	4	5	0
1896.	Males.....	33.9	110	100	3	9	33	29	9	9	5	4	0
	Females	31.2	193	100	1	17	35	24	12	5	5	1	0

* Methods of grouping are explained in foot-note to the sub-head under which this table appears, and in the foot-note to Table 8.

Duration of Consumption.—Fatal and Non-Fatal Cases.

Fatal Cases.

TABLE 10.—*Exhibiting by Sex of Patient, the duration in months and years of fatal cases of sickness from Consumption, in Michigan, during the years 1894-96, Arranged in time-periods. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Consumption.																				
Year.	Sex.	No. of cases in- cluded.	Duration of sickness:—Per cent of Deaths in each Period.																	
			All cases.	1 Month.	2 Months.	3 Months.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.	9 Months.	10 Months.	11 Months.	Under one Year.	1 to 2 Yrs.	2 to 3 Yrs.	3 to 4 Yrs.	4 to 5 Yrs.	Five Years and over.
1894.	Males.....	41	100	9.1	9.1	2.3	4.5	9.1	4.5	2.3	11.4	9.1	6.8	0	68.2	20.5	6.8	0	2.3	2.3
	Females....	88	100	4.5	5.7	11.4	4.5	8.0	6.8	6.8	2.3	9.1	1.1	6.8	67.0	19.3	3.4	8.0	1.1	1.1
1895.	Males.....	43	100	9.3	2.3	2.3	9.3	9.3	10.6	4.7	7.0	2.3	2.3	0	60.5	16.3	9.3	9.3	0	4.7
	Females....	99	100	2.0	7.1	8.1	7.1	4.0	9.1	6.1	6.1	4.0	4.0	3.0	60.6	28.3	5.1	2.0	2.0	2.0
1896.	Males.....	82	100	2.4	8.5	6.1	2.4	18.3	9.8	1.2	3.7	7.3	0	1.2	61.0	26.8	3.7	2.4	0	*6.
	Females....	135	100	3.0	4.4	13.3	5.2	5.2	9.6	6.7	5.2	3.0	3.0	3.7	62.2	17.0	10.4	1.5	3.7	5

* One case was reported as having been sick about 30 years.

Cases of Consumption reported as having Recovered.

In the reports relative to consumption received at this Office during the years 1894-6, twenty-four cases were said to have recovered from the disease; eleven of these cases were reported in 1894, six in 1895 and seven in 1896; they are tabulated below according to sex, age and duration:—

Sex.	Age.	Duration.	Sex.	Age.	Duration.
Males.....	14 years.	Not stated.	Females...	21 years.	2 years and 8 mo.
	18 years.	7 months.		19 years.	5 months.
	27 years.	4 months.		35 years.	3 months.
	Not stated.	3 years and 10 mo.		Not stated.	1 year.
	41 years.	Not stated.		37 years.	2 months.
	19 years.	7 months.		20 years.	Not stated.
	27 years.	8 months.		22 years.	Not stated.
	29 years.	1 year.			
	26 years.	4 months.			
	34 years.	Not stated.			
	26 years.	Not stated.			
	35 years.	2 years.			
||Sex, age and duration not stated in five of the cases reported as having recovered.					

The average age of the eleven male cases, where the ages were stated was 26.9 years; of the six female cases, 25.7 years.

The average duration of sickness, where the time was stated was for males, 14 months; for females, 10.8 months.

Apparent Recovery from Consumption.

G. W. Lowry, M. D., of Hastings, Mich., wrote to the Secretary of this Board, Nov. 10, 1897, relative to an apparent recovery from consumption, as follows:—

"The one case of consumption which I have been reporting during the current year, is now in a condition that with your consent, I will from this on report simply as 'chronic bronchitis,' as there have been no bacilli in the sputa now for 6 or 8 weeks, but he coughs and expectorates a little during the day."

"So much for the persistent use of Dr. Vaughan's nuclein. I have injected the nuclein once or twice a day for 12 months. But he did not get rid of the bacilli until some three months ago when I commenced with the stronger solution (the \$15 per lb. solution); money tells sometimes in medicine, as well as in politics."

INFORMATION CONTAINED IN FINAL REPORTS OF CASES OF CONSUMPTION
DURING THE YEARS 1895-6.

For the year 1895, 42 final reports of fatal cases of consumption in Michigan, were received at this office; for 1896 there were 137 such final reports received relative to fatal cases of consumption. The information contained in these 179 reports, for the two years, is combined and summarized below:

Location of the disease, as mentioned in 159 instances:		Consumptive relatives mentioned in 89 instances:	
	Instances.		Instances.
Lungs.....	141	Sister.....	15
Lungs and throat.....	5	Brother.....	10
Lungs and bowels.....	5	Mother.....	10
Bowels.....	3	Father.....	8
Liver and bowels.....	1	Mother and sister.....	6
Stomach and bowels.....	1	Aunts.....	6
Mesenteric glands.....	1	Daughter.....	5
Stomach.....	2	Grandmother.....	4
Occupation mentioned in 170 instances, as follows:		Uncle.....	3
		Husband.....	3
Housekeeper.....	83	Father and brother.....	3
Farmer.....	32	Wife.....	2
Student.....	17	Father and mother.....	2
Laborer.....	7	Cousins.....	2
Seamstress.....	3	Son.....	2
Saloonkeeper.....	3	Brother and sister.....	2
Clerk.....	3	Parents and aunt.....	1
Merchant.....	2	Grandmother, aunt and cousin.....	1
Watchman.....	2	Niece.....	1
Servant.....	2	Mother and brother.....	1
Cook.....	2	Sisters and husband.....	1
Printer, Nurse, Cutter, R. R. Man, Foreman, Cashier, Mason, Shoemaker, Millhand, Miner, Lumberman, Engineer, and Milliner, each one instance.		Sisters and brother.....	1

Consumptive associates were mentioned in 44 instances, as follows:		Disinfection of soiled articles was mentioned in 85 instances, as follows:	
	Instances.		Instances.
Sister	9	Sulphur fumes	17
Brother	5	Boiled	16
Father	4	Boiled and burned	10
Wife	2	Burned	6
Husband	2	Boiling and sulphur fumes	6
Mother	2	Bichloride of mercury	5
Friend	2	Washing	4
Family	2	Heat and sulphur fumes	4
Neighbor	2	Washing and sulphur fumes	2
Daughter	2	Burying and boiling	2
Son	1	Carbolic acid	2
Mother and sister	1	Lime	2
Parents and aunt	1	Washing and burning	1
Aunt	1	Burning and sulphur fumes	1
Cousins	1	Burning and zinc sulphate	1
Brother and sister	1	Zinc	1
Father and sister	1	Boiling and zinc	1
Not stated	5	Buried and bichloride	1
		Chlorides and sulphur fumes	1
		Washing and carbolic acid	1
		Buried	1
Bowel discharges were disposed of in 82 instances, as follows:			
Privy	25	Lime and sulphur	1
Buried	23	Lime and disinfection	1
Vault	11	Carbolic acid	1
Closet	6	Disinfection and privy	1
Lime	5	Bury and disinfection	1
Buried and lime	3	Bichloride and buried	1
Buried	3	Bichloride and privy	1
Sewer	2	Buried and lime	1
Buried and burned	2	Privy and lime	1
Privy and ashes	2	Privy and disinfection	1

To the question "Was there a case of consumption previous to this one in any family in which this patient formerly resided" on 51 reports the answer was "Yes", and on 73 reports the answer was "No".

In answer to the question "Can you trace any other case of tuberculosis in man to this case" on six reports there was "Yes", and on 117 reports "No".

To the question "Was all the sputum from this patient disinfected before being permitted to dry" on 85 reports the answer was "Yes", and on 26 reports the answer was "No".

In answer to the question "Was isolation of this patient practiced" on 30 reports there was "Yes", and on 89 reports "No".

To the question "Were all the rooms in the patient's residence disinfected" on 75 reports the answer was "Yes", and on 39 reports the answer was "No".

TYPHOID FEVER IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1896.

During the year ending December 31, 1896, there were reported to the Secretary of the State Board of Health 642 outbreaks of typhoid fever (includes "typho-malarial") in 543 localities in Michigan in which there were reported to have occurred 2,506 cases and 409 deaths. Notwithstanding the marked improvement which the State Board of Health has succeeded in bringing about both in promptness and accuracy of reports of local health officials to the central office, it is still evident that not all cases of sickness and deaths from typhoid fever are yet reported. For the year 1896, there were reported to the Secretary of State 553* deaths from typhoid fever,—144 more than were reported to this office. The Secretary of the State Board of Health has estimated that in past years the deaths reported to the Secretary of State should be increased by about 40 per cent in order to equal the actual number of deaths which occurred; according to this estimate, there were probably about 774 deaths from typhoid fever in Michigan during the year 1896.

Typhoid Fever in 1896, compared with previous years.

Comparisons with previous years, to ascertain the comparative increase or decrease of the prevalence of typhoid fever in this State, are interesting and instructive, and they would be more so if there existed a fixed basis on which to found such comparisons; but from year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by the local health officials throughout the State, to furnish in their reports the information desired by the State Board. It is, therefore, still impossible to determine the exact increase or decrease of prevalence of the disease in this State by comparisons of the numbers of outbreaks of the disease, and the cases and deaths reported to this office year by year. This fact should be borne in mind when referring to Table 1.

Typhoid fever occurs in waves, the principal waves appearing to be about twelve years apart, with one or two minor waves intervening. This may be seen by referring to Table 2 and the accompanying diagram, representing the number of deaths per 100,000 persons living. The diagram shows that there has been a considerable reduction in the mortality-rates from typhoid fever in Michigan, especially since 1877. The cause for the great rise in typhoid fever in certain years is to be sought for in the fouling of the water supply; and so far as relates to country districts and places depending upon wells for a water supply, the cause is to be sought for in the fall in the ground water, in wells, etc., as has been pointed out in the preceding reports. Possibly also, in filthy places, the extreme dryness of the surface soil may be found to have causal relation, because the germs are not destroyed at once by drying, and may, therefore, be wafted about by currents of air. Table 2 and the illustrative diagram†

* Includes deaths from "typho-malarial."

† Table 2 and the diagram [plate 843] are printed on the following page. The diagram illustrates this fluctuation for the years, 1868-94.

probably quite accurately represent the annual fluctuations of, though not the total deaths from, typhoid fever in Michigan during the twenty-nine years, 1868-96, as the law for collecting and compiling this information in the office of the Secretary of State has remained nearly the same throughout the twenty-nine years.

TABLE 1.—TYPHOID FEVER.—*Exhibiting the numbers of Outbreaks, Localities, Cases and Deaths reported for each of the thirteen years, 1884-96; also for some of those years the average Cases and Deaths per Outbreak, the Deaths to 100 Cases, and the number of Special Final reports received.*

Year.	Outbreaks Reported.	Localities Reported.	Cases Reported.	Deaths Reported.	Average Cases per Outbreak.	Average Deaths per Outbreak.	Deaths per 100 Cases.	Final Reports Received.
1884.....	-----	245	969	290	-----	-----	27	-----
1885.....	218	200	715	194	3.28	.89	23	-----
1886.....	290	282	1,194	282	4.15	.75	18	60
1887.....	335	320	3,424	411	*7.24	*1.23	17	46
1888.....	316	296	1,511	310	4.78	.98	21	60
1889.....	432	398	2,530	402	†5.17	†.93	†18	115
1890.....	330	310	1,924	304	5.83	.92	16	135
1891.....	543	501	4,670	697	8.60	1.28	15	208
1892.....	527	484	2,591	538	4.92	1.02	21	216
1893.....	545	504	‡3,512	594	6.44	1.09	17	230
1894.....	600	530	2,805	506	4.67	.84	18	321
1895.....	800	695	3,751	621	4.69	.78	17	449
1896.....	642	543	2,506	409	3.90	.64	16	417
Averages, 1886-96...	487	442	2,765	461	5.68	.96	17	205

* The large average numbers of cases and deaths per outbreak in 1887 is partially accounted for by the fact that in two outbreaks the disease became epidemic, resulting in an aggregate of 535 cases and 73 deaths.

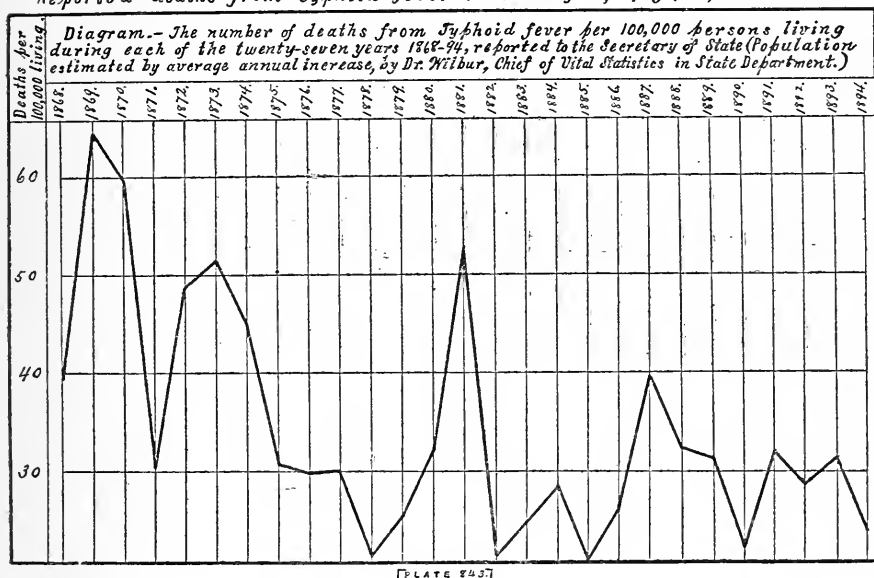
† In computing the average numbers of cases and deaths per outbreak, and the per cent ratio of deaths to cases in 1889, the outbreak at Negaunee, in which 300 cases were reported, is omitted, because the number of deaths which occurred in that outbreak was not reported.

‡ The large number of cases reported in 1893 is accounted for by the fact that in Ironwood the disease became epidemic, and the one outbreak resulted in 824 cases and 38 deaths.

TABLE 2.—*Exhibiting the reported number of deaths from Typhoid Fever per 100,000 persons living in Michigan in each of the 29 years, 1868-96. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department.)*

Year.		1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	
Deaths.....		39.20	64.44	59.46	30.34	48.64	51.29	44.68	30.70	29.87	29.98	21.28	25.26	32.07	52.66	
Year.		1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths..		21.41	24.92	28.41	20.85	26.22	39.40	32.06	31.15	22.21	31.97	28.65	31.25	23.91	28.97	23.28

Reported deaths from Typhoid fever in Michigan, 27 years, 1868-94.



A study of Table 1, shows that there was a decrease of about thirty-three (33.2) per cent in the reported sickness from typhoid fever, in 1896 compared with 1895, and a decrease of about thirty-four (34.1) per cent in the reported deaths.

While there was a decrease of about twenty (19.8) per cent in the number of outbreaks in 1896 compared with 1895, the decrease in the number of final reports received was only seven per cent. This, taken in connection with the steady increase in the last few years, from 1893, in the number of outbreaks reported and the greatly increased number of final reports received, continues to indicate that year by year a larger number of the outbreaks of typhoid fever which occur in this State are being reported to this office.

As stated on the first page of this article, however, implicit reliance cannot yet be placed in the several comparisons which grow out of Table 1; because so much depends upon methods of reporting cases and deaths; for instance, only fatal cases were reported from Detroit in 1894; and the less fatality in 1893 was apparently due to the nature of the epidemic in Ironwood.

Both Tables 3 and 4 show that the death-rate from reported typhoid fever in the State in 1896 was 1.77 per 10,000 inhabitants. This death-rate is much lower than the death-rates for several preceding years. The death-rates based on the number of deaths reported to the Secretary of State differ slightly from those based on the numbers of deaths reported to this office.

TABLE 3.—*Exhibiting the Population of Michigan for the year 1896, by tiers of counties (Upper Peninsula as one tier); also the numbers of cases of, and deaths from Typhoid Fever REPORTED from each of these divisions for 1896, and the numbers of cases and deaths per 10,000 population of each division.*

State, and Counties Grouped by tiers, most Northern Counties First.			Population, 1896,*	Reported Cases of Typhoid Fever, 1896.	Reported Cases per 10,000 of Population.	Reported Deaths from Typhoid Fever, 1896.	Reported Deaths per 10,000 of Population.
State -----			2,315,517	2,506	10.82	409	1.77
Upper Penin- sula -----	{ Keweenaw. Chippewa. Ontonagon. Gogebic. Houghton. Iron. Baraga. Dickinson. Marquette. Menominee. Alger. Delta. Schoolcraft. Mackinac. Luce.	}	219,561	311	14.16	41	1.87
Eleventh tier of counties..	{ Emmet. Cheboygan. Charlevoix. Presque Isle. Leelanaw.	}	44,907	45	10.02	7	1.56
Tenth tier of counties.....	{ Antrim. Osego. Alpena. Montmorency.	}	50,469	27	5.35	5	.99
Ninth tier of counties.....	{ Benzie. Crawford. G'd Traverse Oscoda. Kalkaska. Alcona. Manistee.	}	44,715	44	9.84	10	2.24
Eighth tier of counties.....	{ Wexford. Ogemaw. Missaukee. Iosco. Roscommon.	}	68,430	48	7.01	5	.73
Seventh tier of counties..	{ Mason. Gladwin. Lake. Bay. Osceola. Huron. Clare. Arenac. Oceana.	}	161,297	187	11.59	31	1.92
Sixth tier of counties.....	{ Newaygo. Midland. Mecosta. Isabella.	}	94,010	97	10.32	14	1.49
Fifth tier of counties.....	{ Muskegon. Montcalm. Tuscola. Gratiot. Sanilac. Saginaw.	}	251,350	209	8.31	42	1.67
Fourth tier of counties.....	{ Ottawa. Shiawassee. Kent. Genesee. Ionia. Lapeer. Clinton. St. Clair. Allegan.	}	389,922	566	14.52	74	1.90
Third tier of counties.....	{ Barry. Livingston. Eaton. Oakland. Ingham. Macomb. Van Buren.	}	232,834	294	12.63	27	1.16
Second tier of counties.....	{ Kalamazoo. Washtenaw. Calhoun. Wayne. Jackson.	}	525,805	395	7.51	107	2.04
First tier of counties.....	{ Berrien. Hillsdale. Cass. Lenawee. St. Joseph. Monroe. Branch.	}	232,233	283	12.19	46	1.98

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the Office of the State Board of Health.

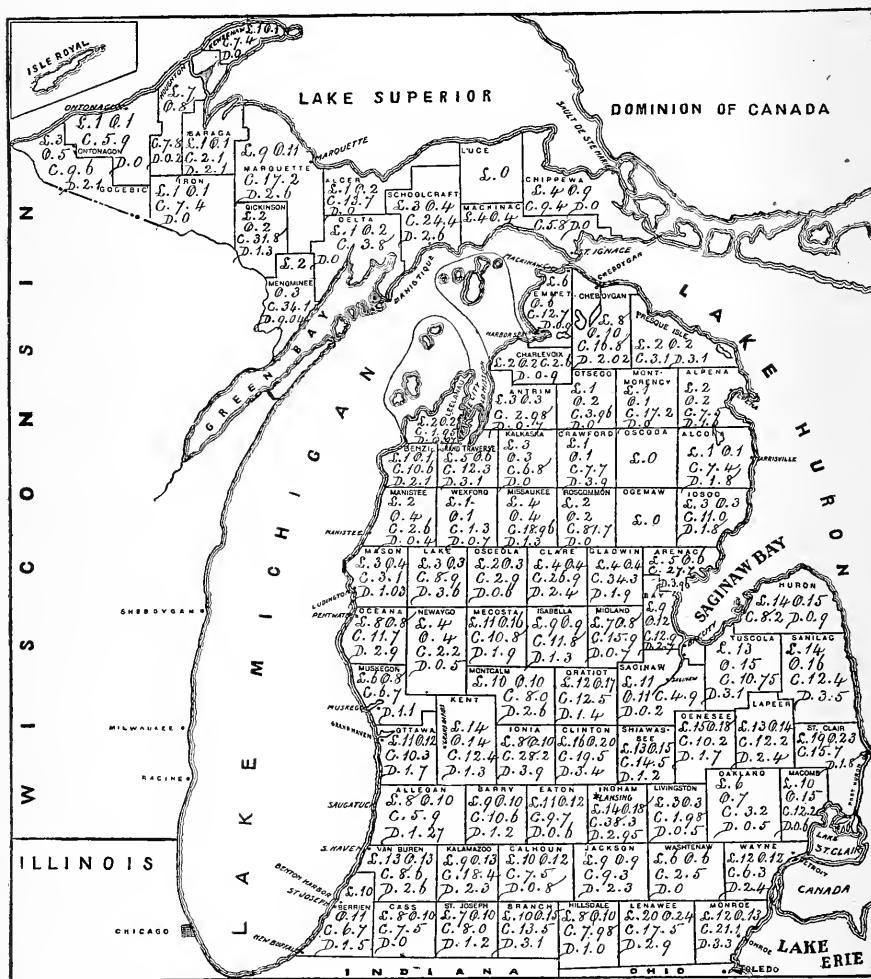
TABLE 4.—Numbers of Cases and Deaths reported from Typhoid Fever, and the Cases and Deaths per 10,000 persons living in each county in Michigan during the year 1896. (Compiled from reports of health officers, clerks, etc.)

State and Counties.	Population of Michigan for 1896.*	Number of reported		Number per 10,000 population, of		Counties.	Population of Michigan for 1896.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,315,517	2,506	409	10.82	1.77	Keweenaw ...	2,693	2	0	7.43	.00
						Lake	5,593	5	2	8.94	3.58
Alcona	5,423	4	1	7.38	1.84	Lapeer	28,712	35	7	12.19	2.44
Alger	1,459	2	0	13.70	.00	Leelanaw	10,281	2	1	1.95	.97
Allegan	39,303	23	5	5.85	1.27	Lenawee	48,588	85	14	17.49	2.88
Alpena	18,785	14	3	7.45	1.60	Livingston	20,227	4	1	1.98	.49
Antrim	13,434	4	1	2.98	.74	Luce	2,294	0	0	0	0
Arenac	7,573	21	3	27.73	3.96	Mackinac	6,941	4	0	5.76	.00
Baraga	4,830	1	1	2.07	2.07	Macomb	32,674	40	2	12.24	.60
Barry	23,657	25	3	10.57	1.22	Manistee	27,056	7	1	2.58	.37
Bay	63,750	82	17	12.86	2.67	Marquette	38,972	67	10	17.19	2.58
Benzie	9,476	10	2	10.55	2.11	Mason	19,440	6	2	3.08	1.03
Berrien	47,810	32	7	6.69	1.46	Mecosta	21,245	23	4	10.82	1.88
Branch	25,913	35	8	13.51	3.09	Menominee	24,345	83	22	34.09	9.04
Calhoun	49,458	37	4	7.48	.81	Midland	14,499	23	1	15.86	.69
Cass	21,288	16	0	7.51	.00	Missaukee	7,909	15	1	18.96	1.26
Charlevoix	11,702	3	1	2.56	.85	Monroe	33,603	71	11	21.13	3.27
Cheboygan	14,857	25	3	16.83	2.02	Montcalm	34,919	28	9	8.02	2.58
Chippewa	16,974	16	0	9.43	.00	Montmorency	2,914	5	0	17.16	.00
Clare	8,185	22	2	26.87	2.44	Muskegon	35,980	24	4	6.67	1.11
Clinton	26,139	51	9	19.51	3.44	Newaygo	18,449	4	1	2.17	.54
Crawford	2,584	2	1	7.74	3.87	Oakland	43,392	14	2	3.23	.46
Delta	21,228	8	0	3.77	.00	Oceana	17,050	20	5	11.73	2.93
Dickinson	15,074	48	2	31.84	1.33	Ogemaw	5,666	0	0	0	0
Eaton	32,880	32	2	9.73	.61	Ontonagon	8,432	5	0	5.93	.00
Emmet	11,825	15	1	12.68	.85	Osceola	17,398	5	1	2.87	.58
Genesee	41,115	42	7	10.21	1.70	Oscoda	1,757	0	0	0	0
Gladwin	5,246	18	1	34.31	1.91	Otsego	5,055	2	0	3.96	.00
Gogebic	14,542	14	3	9.63	2.06	Ottawa	40,946	42	7	10.26	1.71
Gr'd Traverse	19,595	24	6	12.25	3.06	Presque Isle	6,523	2	2	3.06	3.06
Gratiot	28,830	36	4	12.49	1.39	Roscommon	1,469	12	0	81.69	.00
Hillsdale	30,078	24	3	7.98	1.00	Saginaw	81,634	40	2	4.90	.24
Houghton	48,568	38	1	7.82	.21	Sanilac	34,623	43	12	12.42	3.47
Huron	34,112	28	3	8.21	.88	Schoolcraft	7,782	19	2	24.42	2.57
Ingham	40,701	156	12	38.33	2.95	Shiawassee	33,805	49	4	14.49	1.18
Ionia	35,830	101	14	28.19	3.91	St. Clair	55,429	87	10	15.70	1.80
Iosco	10,598	12	2	11.01	1.84	St. Joseph	24,953	20	3	8.02	1.21
Iron	5,427	4	0	7.37	.00	Tuscola	35,364	38	11	10.75	3.11
Isabella	22,767	27	3	11.81	1.32	Van Buren	31,318	27	8	8.62	2.56
Jackson	47,287	44	11	9.30	2.33	Washtenaw	44,159	11	0	2.49	.00
Kalamazoo	43,448	80	10	18.41	2.30	Wayne	310,135	196	74	6.32	2.39
Kalkaska	5,880	4	0	6.80	.00	Wexford	15,432	2	1	1.30	.65
Kent	127,946	159	16	12.42	1.25						

* Population estimated by average annual increase. (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the Office of the State Board of Health.

DISTRIBUTION OF TYPHOID FEVER IN MICHIGAN IN 1896.

BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.



Σ = Localities; O = Outbreaks; C = Cases per 10,000 population; P = Deaths per 10,000 population.

[PLATE 933.]

Sickness-rates from Reported Typhoid Fever in 1896.

While it is probable that the reporting of cases of sickness from typhoid fever is not as complete as the reporting of deaths from that disease, yet comparisons may be made, subject to a mental reservation that not all cases are reported, and that it is quite possible that the omissions are greater in some parts of the State than in others.

Considering the State by tiers of counties, Table 3 shows that the greatest reported prevalence of typhoid fever was in the fourth tier of counties, where the sickness-rate was 14.52 cases per 10,000 inhabitants; and the least prevalence was in the tenth tier, where the sickness-rate was only 5.35 cases. In the first, third, seventh and Upper Peninsula tiers the sickness-rate, though not so high as that in the fourth tier, was slightly higher than the average rate for the State.

In 1893 the sickness-rate from typhoid fever in the Upper Peninsula was nearly five times as great as the sickness-rate for the whole State. In 1894 it was over twice as great; but in 1895 and 1896 the sickness-rate in the Upper Peninsula was much lower than in 1893 and 1894, and was much nearer the sickness-rate for the State.

A study of the cause of so high a sickness-rate in the Upper Peninsula in 1893 was made on page 261 of the Annual Report of this Board for 1894.

By counties, the greatest sickness-rate reported from this disease in 1896 was in Roscommon county, where the ratio of cases to population was 81.69 per 10,000. The sickness-rates of several other counties were largely in excess of the average rate for the whole State, they being as follows:—Schoolcraft 24.42, Clare 26.87, Arenac 27.73, Ionia 28.19, Dickinson 31.84, Menominee 34.09, Gladwin 34.31, Ingham 38.33, per 10,000 persons living in those counties; whereas the average sickness-rate for the State was only 10.82 per same number of inhabitants. The three counties Luce, Ogemaw and Oscoda, with a total population of 9,717, were the only counties from which typhoid fever was not reported in 1896.

Death-rates From Reported Typhoid Fever in 1896.

The last columns in Tables 3 and 4 supply data for a more satisfactory comparison of sections of the State with reference to typhoid fever than is supplied by the data relative to cases of sickness from that disease.

Table 3 shows that the greatest death-rate was in the ninth tier of counties, and that the second, first, seventh, fourth and Upper Peninsula tiers, each had a greater death-rate than the average death-rate for the whole State in 1896.

Although, as shown in Table 3, the ninth tier of counties had the highest death-rate, Table 4 shows that none of the counties comprising that tier had many deaths. In this tier the counties have small populations. So that while the actual number of deaths in the counties in this tier are small, the death-rates are high. In this tier Grand Traverse had 6, Benzie 2, Crawford and Alcona each had 1, Kalkaska and Oscoda had no deaths reported, and Oscoda had no sickness reported from this disease.

The county having the highest death-rate was Menominee, which had a death-rate of 9.04 deaths per 10,000 inhabitants, which was five times the average death-rate for the whole State, and more than double the death-rate of any other county. The deaths in this county were all reported from Menominee city, and but one case of typhoid fever (in Mellen Tp.) was reported outside the city.

The counties having the next highest death-rates were:—Arenac, 3.96; Ionia, 3.91; Crawford, 3.87; and Lake, 3.58.

In counties from which deaths were reported, the lowest death-rate was in Houghton county, which had .21 of one death per 10,000 inhabitants. Saginaw, .24; Manistee, .37; and Oakland, .46 had slightly higher death-rates. From 13 counties having an aggregate of 91 cases there were no deaths reported.

Sickness and Death-rates From Typhoid Fever Higher in Thickly Inhabited Localities.

Numerous instances taken from the compilations of the reports of health officers for various years, seem to demonstrate beyond a doubt that the sickness and death-rates are higher in centres of population than in the rural districts. In 1896 there were about 26 counties wherein the sickness and death-rates in some one or two centres of population—cities and villages—were conspicuously higher than the rates for the counties in which they were situated, aside from these particular localities, as: in Iron Mountain, Dickinson county, the sickness-rate was 52.3 and the death-rate 2.6 per 10,000 inhabitants; while in Dickinson county, aside from Iron Mountain, the sickness-rate was 9.7 and no deaths were reported. In Lansing, Ingham county, there were 57.5 cases and 4.6 deaths per 10,000 inhabitants, while in Ingham county aside from the city of Lansing there were but 24.3 cases and 1.7 deaths to the same number of inhabitants. Kalamazoo city had a sickness rate of 25.2 cases per 10,000 inhabitants, and a death-rate of 3.1; Kalamazoo county, outside the city, had a sickness-rate of 11.1, and a death-rate of 1.4. The city of Belding had a sickness-rate of 192.1, and a death-rate of 16.5, while in Ionia county, outside of the city, the sickness-rate was only 9.6, and the death-rate but 2.5. In Menominee city the sickness-rate was 60.8, the death-rate, 16.3, and in the county, outside of the city, there was but .9 of one case per 10,000 inhabitants and no deaths. The rates in Grand Rapids were, 14.9 cases and 1.5 deaths per 10,000 inhabitants, and in Kent county, outside the city, the rates were 6.7 cases and .8 of one death, per 10,000 inhabitants. In the cities of Detroit and Wyandotte, the rates were 6.4 cases and 2.7 deaths per 10,000 inhabitants, and in Wayne county exclusive of these cities the rates were 5.7 cases and 1.0 deaths per 10,000 inhabitants.

Typhoid Fever Spreads Most From Thickly-Inhabited Places.

Of the localities from which typhoid fever was spread into Michigan from "Outside the State" such localities as are mentioned definitely are generally cities. Chicago was reported as having been the source of infection of typhoid fever in five instances, and from two of the localities so infected the disease was reported to have spread to two other localities. Duluth, Minn., was reported as having been the source of contagium in three instances, resulting in 8 cases and 1 death. Joilet, Ill., South Bend, Ind., Toledo, Findlay and Lakeside, Ohio, Hibbing, Minn., Ashland, Wis., Pensacola, Florida, were each reported as having been the source of contagium in one instance, with a result of 38 cases and 7 deaths. Washington, D. C., was reported as the source of contagium in one instance, and from this place the disease spread to another or third locality.

The other "Outside" localities reported as having been the source of contagium of outbreaks of typhoid fever in Michigan were more indefinitely reported as: Canada in 2 instances, Indiana and Ohio, each in 5 instances, the Dakotas in 2 instances, Arkansas, England, Pennsylvania, Virginia, and "Southern States," in one instance each. The result of this infection was 70 cases and 5 deaths.

Grand Rapids, Detroit, Kalamazoo, Port Huron, and Wyandotte cities were reported as the source of contagium in three instances each. Grand Rapids was reported as the probable source in one instance.

Of the 71 localities within and without the State from which typhoid fever was reported definitely to have spread in Michigan, in 1896, (Table 7) 40 were cities and villages from which 58 other localities were infected, (3 more localities were infected as third localities); 18 were townships from which 20 localities were infected; and 13 localities, which were not definitely located, spread typhoid fever to 22 localities. In the second instances, or where third localities were infected from the second, three out of four localities from which the disease spread were cities and villages.

Typhoid Fever in Each Month of the Year 1896.

TABLE 5.—*Exhibiting the reported number of outbreaks of Typhoid Fever which Began, the number which Ended, and the number of outbreaks which were Present, in each Month of the Year 1896, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Outbreaks began ..	45	22	20	26	25	48	75	102	101	58	30	21	573
Outbreaks ended ..	10	18	22	23	17	18	21	37	67	103	79	64	479
Outbreaks present.	59	63	61	63	63	89	141	214	263	247	164	106	-----

TABLE 6.—*Exhibiting the Number and Per Cent of Cases of Typhoid Fever in Michigan in each Month during the Year 1896. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases sick in any part of the month...	137	113	122	154	85	121	243	470	750	612	383	227
Per cent the cases sick in each month were of total reported cases	5	5	5	6	3	5	10	19	30	24	15	9

The first line of figures in Table 6 shows the number of cases reported sick in any part of each month. As some of the cases were sick longer than one month, they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1896; and as the last line of figures in this table shows the per cent the cases sick in each month were of the exact number of cases reported to this office in 1896, the sum of the figures in the last line of the table exceeds 100.

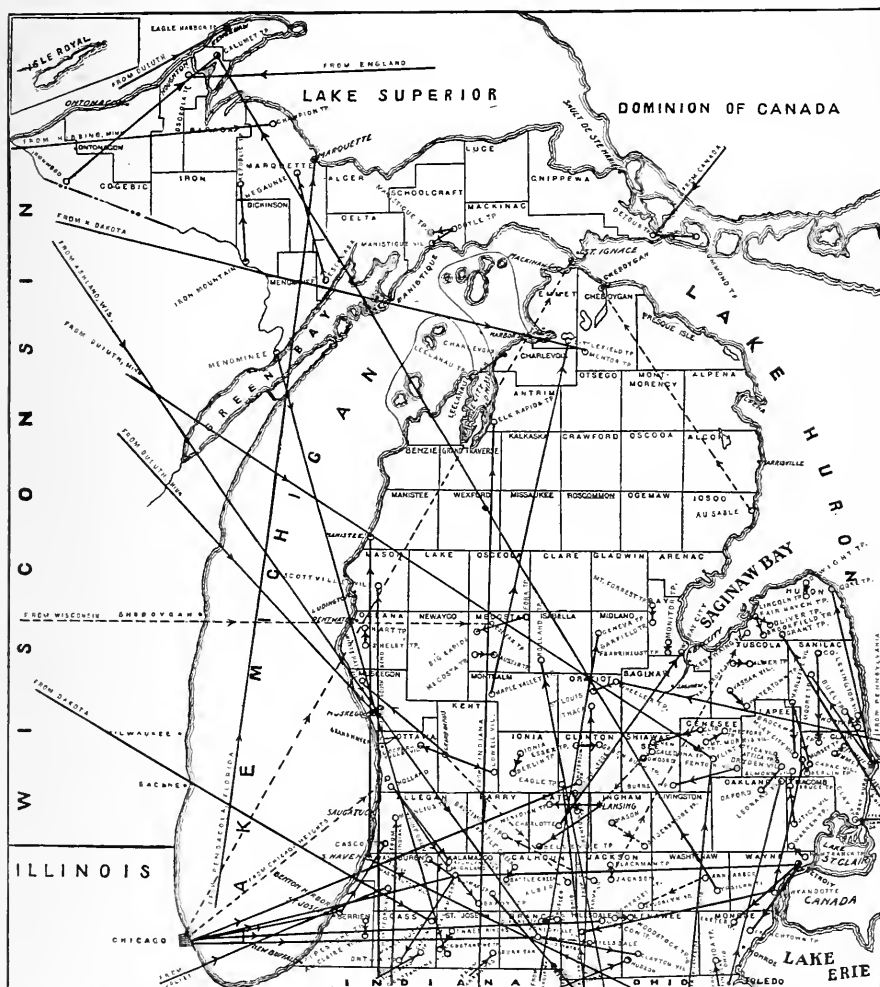
Source of Contagium of Typhoid Fever.

EXHIBIT I.—*The Reported "Source of Contagium" of Cases of Typhoid Fever in Michigan during the year 1896.*

Reported sources.	Cases.
Traced to former cases.....	208
Probably traced to former cases.....	27
Attributed to infected, contaminated, or surface water.....	590
Cases reported as coming from outside jurisdictions.....	127
Attributed to defective sewerage or drainage.....	13
Attributed to filthy or unsanitary conditions.....	51
Contaminated milk or food supply.....	3
Cases, the sources of contagium of which were reported as unknown.....	621
Cases, the sources of contagium of which were not reported, or the statements were too indefinite for classification*.....	866
Total.....	2,506

* Out of 70 cases reported from Belding, in 1896, some were attributed to water, some "probably from bad drainage," some "from using water out of a frame well." But the numbers were not stated in any instance so 68 of the cases were put under the head "Not Stated." One case under the head "contaminated water" and one case under the head "bad drainage."

MOVEMENTS OF CONTAGIUM OF TYPHOID FEVER IN MICHIGAN IN 1896.



THIS MAP ILLUSTRATES TABLE 7. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS.

[PLATE 935] ——— DEFINITELY TRACED. - - - - - PROBABLY TRACED.

TABLE 7.—*First, second and third localities, where the second locality was infected with Typhoid Fever from the first, and the third was infected from the second; and the numbers of cases and deaths from Typhoid Fever in the first, second and third localities, with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Bay county: Monitor township..... (Sept. 3-Oct. 18.)	4	3	Bay county: Frankenlust township (Sept. 6-Dec. 12.)	9	1			
Bay county: Mt. Forest township....	*	---	Bay county: Garfield township..... (Nov. —.)	1	1			
Berrien county: Pipestone township (Sept. 16-Oct. 8.)	1	0	Berrien county: Eau Claire village.....	5	1			
Branch county: Butler township..... (Nov. 15-Feb., 1897.)	3	1	Branch county: Girard township..... (Dec. 5-Dec. 28.)	1	0			
Calhoun county: Battle Creek city (Feb.-Apr. 4.)	3	0	Calhoun county: Battle Creek township (Feb. 21-Apr. 4.)	4	0			
Charlevoix county: Charlevoix city.....	*	---	Leelanaw county: Leelanaw township.... (Sept. 11-Oct. 18.)	1	0			
Chippewa county: Drummond township....	*	---	Chippewa county: Detour township.....	1	0			
Clinton county: Essex township.....	*	---	Clinton county: Greenbush township.. (Jan.-Jan. 31.)	1	1			
Delta county: Escanaba city.....	*	---	Marquette county: Negaunee city.....	24	5			
Dickinson county: Iron Mountain city..... (June 8-Dec. 12.)	41	2	Marquette county: Republic township.... (Aug. 7-Nov. 15.)	5	0			
Eaton county: Charlotte city.....	*	---	Bay county: West Bay city..... (May 17-June 6.)	1	0			
Eaton county: Grand Ledge city..... (Jan. —.)	14	0	Eaton county: Benton township (Sept. 9-Sept. 24.)	1	1			
Genesee county: Chlo village.....	*	---	Shiawassee county: New Haven township.. (Aug. 18-Sept. 5.)	1	0			
Genesee county: Fenton village.....	2	1	Shiawassee county: Burns township..... (Aug. —.)	1	0			
Genesee county: Mt. Morris village (Aug. 15-Sept. 8.)	2	0	Genesee county: Thetford township.... (Sept. 2-Oct. 15.)	1	0			
Gogebic county: Ironwood city.....	8	0	Houghton county: Calumet township	3	0			
Hillsdale county: Somerset township.....	2	0	Lenawee county: Woodstock township..	1	0			

* Typhoid Fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 7.—CONTINUED.—*Movement of Infection.*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Huron county: Dwight township.....	*	---	Huron county: Lincoln township..... (Nov.-Dec. 16.)	1	0			
Huron county: Fair Haven township ..	*	---	{ Huron county: Brookfield township.. (Jan. 4-Feb. 10.)	1	0			
			{ Oliver township..... (Apr. 1-June 2.)	4	0			
Ingham county: Lansing city..... (May 30-Dec. 24.)	60	6	{ Eaton county: Bellevue township.... (July 7 —.)	1	0			
			{ Ingham county: Meridian township.... (Sept. 13-Oct. 10.)	1	0			
Ionia county: Ionia city.....	2	1	Ionia county: Berlin township.....	9	3			
Jackson county: Jackson city..... (1895-Dec. 28.)	29	7	Jackson county: Blackman township .. (— Dec.)	1	0			
			{ Cass county: Ontwa township	2	0			
			{ Kalamazoo county: Brady township..... (Aug. 25-Oct. 4.)	2	0			
Kalamazoo county: Kalamazoo city..... (Feb. 22-Feb. 4, 1897.)	55	7	{ Van Buren county: Pine Grove township.. (Oct. 16-Nov. 23.)	1	1			
			{ Kent county: Lowell village..... (Oct. 20-Nov. 10.)	1	0			
Kent county: Grand Rapids city..... (Dec. 29, 1895-Dec.)	133	13	{ Muskegon county: Whitehall village	1	0			
			{ Ottawa county: Coopersville village.... (Aug. 27-Oct. 2.)	1	1			
Lapeer county: Almont village..... (June 5-Sept. 6)	3	0	Macomb county: Bruce township..... (June 23-July 2.)	1	0			
Lapeer county: Attica village..... (Aug. 10-Oct. 21.)	6	0	Lapeer county: Attica township.....	1	1			
Macomb county: Utica village.....	*	---	Macomb county: Bruce township..... (June 18-July 3.)	1	0			
Mecosta county: Fork township..... (Mar.-Aug.)	2	0	Mecosta county: Big Rapids city..... (Apr. 2-Apr. 28.)	1	0			
Mecosta county: Mecosta township.....	1	0	Mecosta county: Austin township	2	0			
Menominee county: Menominee city..... (Mar.-Sept.)	82	22	St. Joseph county: Constantine village... (Sept. 7-Oct. 4)	1	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection.*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Montcalm county: Maple Valley township. (Oct.-Nov.)	1	0	Emmet county: Littlefield township.. (Oct.-Oct. 30.)	1	0			
Oakland county: Oxford	*	---	Lapeer county: Dryden village	1	0			
Oceana county: Shelby township	1	1	Oceana county: Hart township	10	2			
Ottawa county: Holland city	3	0	{ Kalamazoo county: Richland village	4	0			
(July-Dec. 27.)			{ (- Aug.)					
			{ Richland township	1	0			
			{ (Sept. 1-Sept. 21.)					
Sanilac county: Marlette village	*	---	{ Lapeer county: Imlay City village	2	1			
			{ (Sept. 3-Oct. 16.)					
			{ St. Clair county: Capac village	1	0			
			{ (Aug. 31-Oct. 1.)					
Sanilac county: Worth township	2	1	Sanilac county: Lexington village	1	1			
(Oct.-Nov. 20.)			(Oct. 10-Oct. 27.)					
Sanilac county	---	---	St. Clair county: Brockway township	1	1			
			(Sept. 1-Sept. 15.)					
Schoolcraft county: Doyle township	4	0	{ Schoolcraft county: Manistique village	5	1			
			{ (Aug.-Dec)					
			{ Manistique township.	9	1			
Shiawassee county: Owosso city	26	3	Shiawassee county: Caledonia township	2	0			
(July 8-Dec. 9.)			(July 17-Oct. 1.)					
St. Clair county: Berlin township	*	---	St. Clair county: Mussey township	1	0			
			(Aug. 7-Sept. 10.)					
St. Clair county: Emmett village	5	0	St. Clair county: Kenockee township	1	0			
(July 20-Oct. 27.)			(Oct. 21-Nov. 7)					
			{ Huron county: Gore township	1	0			
			{ (Oct. 11-Nov. 19)					
St. Clair county: Port Huron city	23	3	{ Sanilac county: Buel township	3	1			
(Jan. 1-Oct. 10.)			{ (Sept. 9-Nov. 20)					
			{ Moore township	2	1			
			{ (Apr. 28-June 10.)					
St. Joseph county: Three Rivers city	1	0	St. Joseph county: Constantine township	1	0			
(May 2-May 30.)			(May --)					
Tuscola county: Fair Grove township	1	0	Tuscola county: Almer township	1	1			
(May 29-June 20.)			(Oct. 4 Oct. 11.)					
Tuscola county: Vassar village	1	1	Tuscola county: Watertown township	1	0			
(Sept. --)			(Sept.-Oct. 1.)					

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection.*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Washtenaw county: Ypsilanti city.....	*	---	Houghton county: Calumet township.... (July 21-Oct. 20.)	7	1			
			{ Kalamazoo county: Kalamazoo city..... (July 11,—.)	1	0			
Wayne county: Detroit city..... (Jan. 1-Dec. 31.)	128	66	{ Monroe county: Exeter township..... (Dec. 1-Jan., 1897.)	3	0			
			{ Frenchtown township (Aug. 17-Aug. 20.)	1	1			
Wayne county: Hamtramck township.. (Sept. 7-Sept. 14.)	1	1	Macomb county: Warren township..... (Oct. 5-Nov. 7.)	1	0			
Wayne county: Wyandotte city..... (Jan. 6-Nov. 6.)	38	3	{ Hillsdale county: Jonesville village.... (Mar. 7-Apr. 15.)	1	0			
			{ St. Clair county: Mussey township..... (Aug. 18-Sept. 20.)	1	0			
Northern part of State..	---	---	Montcalm county: McBride village..... (July 4-July 14.)	1	0			
Movement of Infection of Typhoid Fever Into Michigan from outside the State.								
Arkansas.....			St. Joseph county: Burr Oak township.... (May 19-May 31.)	1	0			
Canada.....			{ Chippewa county: Detour township..... (Sept. 5-Sept. 30.)	1	0			
			{ St. Clair county: Clay township..... (July 20-Nov. 3.)	11	1			
England.....			Houghton county: Osceola township..... (Oct. 26-Jan. 15, 1897.)	16	1			
Florida: Pensacola.....			Marquette county: Marquette city..... (Apr. 22-May 22.)	1	1			
Illinois: Joliet.....			Van Buren county: Hartford village..... (Dec. 28, 1895,—.)	2	0			
			{ Allegan county: Manlius township.... (Mar. 12-June 20)	7	0			
			Antrim county: Eck Rapids township.. (Oct. 5-Feb. 10, 1897.)	2	0			
Indiana.....			Lenawee county: Hudson city..... (July 24-Aug. 18.)	1	0			
			Mason county: Scottville village.... (— Jan. 14, 1897.)	3	1			
			Midland county: Geneva township..... (July 30-Nov. 4.)	8	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Typhoid Fever Into Michigan from outside the State.*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Indiana: South Bend.....			Cass county: Calvin township..... (June-Nov.)	4	0			
			{ Genesee county: Flint city..... (Jan.-Feb. 15.)	5	1			
Minnesota: Duluth.....			{ Keweenaw county: Eagle Harbor t'wnship (Jan. 6-Mar. 20.)	2	0			
			{ Muskegon county: Muskegon city..... (Jan. 20-Feb. 1.)	1	0			
Minnesota: Hibbing.....			Marquette county: Champion township.. (Sept. 8-Sept. 27.)	1	1			
			{ Clinton county: Eagle township..... (Sept. 12-Oct. 20.)	1	0			
			Gratiot county: Ithaca village..... (Jan. 26-Mar. 3.)	1	0			
Ohio.....			{ Gratiot county: Ithaca village..... (Sept. 3-Oct. 1.)	1	0			
			Isabella county: Rolland township..... (Nov. 1-Nov. 26.)	1	1			
			{ Kalamazoo county: Olimax township..... (Sept. 13-Nov. 10.)	6	1			
Ohio: Findlay.....			Monroe county: Ida township..... (Sept. 9-Jan., 1897.)	19	3			
Ohio: Lakeside.....			Genesee county: Flint city..... (July 21-Nov. 14.)	8	2			
Ohio: Toledo.....			Oakland county: Leonard village..... (Aug. 15-Sept. 10.)	1	0			
Pennsylvania.....			Gratiot county: Wheeler township.....	3	0	Gratiot county: St. Louis city.....	4	3
Southern States.....			St. Clair county: Grant township..... (May 7-June 5.)	1	0			
Virginia.....			Huron county: Grant township..... (Aug. 25-Oct. 28.)	4	0			
Washington, D. C.....			Van Buren county: South Haven village..	2	0	Manistee county: Manistee city.....	1	0
Wisconsin: Ashland.....			Branch county: Coldwater city..... (Nov. 13-Dec. 21.)	2	0			

TABLE 7.—CONCLUDED.—*Movement of Infection of Typhoid Fever Into Michigan from outside the State.*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Chicago			Berrien county: Benton Harbor city... (Oct. 13-Nov. 15.)	1	0	Allegan county: Casco township.....	1	1
			Branch county: Coldwater city..... (Dec. 2 —.)	1	0	Lenawee county: Clayton village..... (Dec. 28-Jan. 6, '97)	1	1
			Clinton county: Watertown township. (Jan. 4-Feb. 16)	1	0			
			Hillsdale county: Moscow township..... (Apr. 11-May 9.)	1	0			
			Kalamazoo county: Kalamazoo city..... (Sept. 19, —.)	1	0			
Dakota			Cass county: Marcellus township... (Sept. 20 Oct. 30.)	1	0			
Dakota (North).....			Cheboygan county: Mentor township..... (Oct.-Dec.)	1	0			
Probable Movement of Infection of Typhoid Fever.								
Branch county: Coldwater city..... (1895-Feb., 1896.)	1	0	Hillsdale county: Hill-dale city..... (Feb. 11-Mar. 20.)	1	0			
Ingham county: Mason city..... (Apr. 24-Nov.)	18	0	Ingham county: Stockbridge township (July 5-Aug. 8.)	2	0			
Iosco county: Au Sable.....	*		Cheboygan county: Cheboygan city..... (June 1-Nov. 15.)	10	1			
Jackson county: Jackson city..... (Jan.-Dec. 28.)	29	7	Huron county: Sebewaing village..... (Oct. 4-Jan. 3, 1897.)	2	0			
Jackson county: Parma village..... (Sept. 12-Sept. 18.)	1	1	Barry county: Baltimore township... (Feb. 27-May)	4	0			
Kent county: Grand Rapids city..... (Dec. 29, 1895-Dec. 1896.)	133	13	Calhoun county: Albion city..... (Feb. 27-May)	2	0			
Shiawassee county: Owosso city.....	26	3	Ingham county: Lansing city.....	1	0			
Washtenaw county: Ann Arbor city.....	3	0	Jackson county: Brooklyn village..... (July 10-Feb. 17, '97.)	6	2			
Probable Movement of Infection of Typhoid Fever Into Michigan from outside the State.								
Chicago			Mackinac county: Mackinac Island vil... (July 1-Aug. 15.)	1	0			
Illinois: Chicago Heights.....			Ottawa county: Holland township... (Aug. 10-Oct. 2.)	1	0			
Wisconsin.....			Mecosta county: Colfax town-hip..... (Mar. 16-Mar. 20.)	1	1			

* This foot-note is on the bottom of the first page of this table.

Outbreaks Attributed to Infected, Contaminated or Impure Water.

The following are extracts from reports by a few of the health officials, who attributed the cause of 590 cases of typhoid fever, in their jurisdictions, to infected, contaminated, impure, or surface water,—with the name of the health officer (or other health official) and the name of the jurisdiction subjoined:—

"Was caused by drinking water from a well situated near a barn-yard. The drainings from the barn-yard soaked down into the well and rendered it unfit for use."—*F. A. Warren, M. D., Tekonsha Tp., Calhoun Co.*

"I should regard the wells at both families as bad. They fill with surface water after heavy rains and have wooden pumps, and I understood were never cleaned out. In the ——— family seven or eight persons all live in one room and sleep in two bedrooms. There is a creek running between the two houses, and low land along it."—*O. W. Tock, M. D., Flushing Tp., Genesee Co.*

"From drinking water from a well. The proof of this is this: On my first visit they were directed to boil all the water before using. The hired girl (No. 2) did not like the taste, drank the water and had the fever. None of the others had it."—*W. N. Keeler, M. D., Concord Tp., Jackson Co.*

"From an infected well at a house where there were several cases last fall."—*James W. Losee, M. D., Pontiac city, Oakland Co.*

"I attribute the disease in each case to the fact that last year their wells were dry for months. They now have water in them and they have used it without first washing the wells. I believe vegetable growths came into the wells while dry (fungus, perhaps, such as toad-stools), etc.

"Where the wells are which I believe conveyed the fever the soil is a sandy loam with a heavy clay subsoil from three to six or eight feet down. Last year during nearly the entire season this sandy loam was very dry. I have thought, if any reason other than the rotting mold which would accumulate in the dry wells need be sought for, that the accumulated vegetation which grew last year and had not been washed in any way because of the drought, might this year in many instances so saturate the surface soil from which all the water in the infected places comes as to poison it for drinking purposes."—*N. D. Yale, M. D., Deerfield Vil., Lenawee Co.*

"The patient drank the water from an infected well in Battle Creek city."—*Geo. R. Peet, Battle Creek Tp., Calhoun Co.*

"Drinking water from the dead end of a water main."—*F. T. Fenton, M. D., Richmond Vil., Macomb Co.*

"Caused by drinking low water as there were only twelve inches in well."—*Geo. Kivel, Greenleaf Tp., Sanilac Co.*

Outbreaks of Typhoid Fever Attributed to Defective Drainage or Sewerage, Filth or Unsanitary Conditions, Etc.

The following are a few extracts from reports of health officials, with the names and jurisdictions subjoined, relative to cases of typhoid fever attributed to defective drainage or sewerage, unsanitary conditions, etc.

Outbreaks Attributed to Defective Sewerage and Drainage.

"The case was in the Cass Co. jail, where the annex, which contains the cells, has a stone floor which is scrubbed twice a week and the scrub water is disposed of by allowing it to run through a hole in the floor at one end of the building where a steam pipe comes up through the floor. Thus the sewage runs on top of the ground under the building where the prisoners are confined day and night, and has been so disposed of for years. The result is, the ground is thoroughly saturated with sewage, and gases escaping from it rise into the rooms occupied by the prisoners. I have had a pipe laid to conduct the sewage into a cess-pool which is well trapped and disinfected the ground underneath the cells as best I could."—*A. B. Conklin, M. D., Cassopolis Vil., Cass Co.*

"Supposed to come from a badly drained cellar."—*F. O. Tefft, M. D., Tecumseh Vil., Lenawee Co.*

"By a concealed cess-pool opening in kitchen."—*W. M. Ikeler, M. D., Three Rivers city, St. Joseph Co.*

"Infected well and cess-pool under house."—*G. D. Spencer, M. D., Locke Tp., Ingham Co.*

Outbreaks Attributed to Filth and Unsanitary Conditions.

"Garbage about the premises."—H. A. Gleason, M. D., *Arenac Tp., Arenac Co.*

"By foul air from swamps."—Chas. W. Pierson, *Arthur Tp., Clare Co.*

"Decaying vegetable and animal found accumulated in the cistern."—C. S. Sackett, M. D., *Brookfield Tp., Eaton Co.*

"It was thought to have been contracted working in the big ditches and swamps."—J. F. Suydam, M. D., *Arcade Tp., Gratiot Co.*

"A slaughter-house situated not more than seven rods from house."—C. A. Wood, M. D., *Madison Tp., Lenawee Co.*

"Unsanitary surroundings."—E. E. Lamb, M. D., *Republic Tp., Marquette Co.*

"From a stable close to the house and stagnant water around the house."—J. H. Ploss, *Elbridge Tp., Oceana Co.*

Typhoid Fever in Mottville Tp. Traced to an Infected Well.

A letter from Dr. J. J. Sweetland, health officer of Mottville Tp., St. Joseph county, in regard to an outbreak of nine cases of typhoid fever in his jurisdiction, is as follows:—

"On Aug. 11, 1896, I was called to see a case of typhoid fever, a girl, aged fourteen, one of a family of seven.

"I found an open dug well within 10 feet of the house with about four feet of water standing in it, and as the dug well *went dry* every summer they had, a few years ago, drove a pipe about six feet into the bottom of the well. I also found about 12 feet from the well an old abandoned cistern with about 4 bbls. of water, dead frogs, mice, etc., in it.

"My instructions for them to boil all water before using was followed for about four weeks—during this time no new cases. I ordered the well and cistern filled up. This was not done. As soon as they began to use the water without boiling, four others came down with typhoid. About this time a lady friend called, drank water and in ten days was sick with typhoid. A lady called on the last girl while sick and had typhoid. The other case I did not attend. I reported all cases to the health officer. He left no instructions, no disinfectants. He called the cases *ague*. He never graduated, never in college but six weeks, yet our town board appointed him health officer. I called our supervisor's attention to the fact that he was not a qualified M. D., but he would not prosecute him. I gave him his choice to leave the State or be arrested, and he left.

"I see no reason why there should have been but the one case if the health officer and town board had done their duty."

Typhoid Fever in Manistique Vil. and Tp., Schoolcraft Co., Traced to an Infected Well in Doyle Tp., Schoolcraft Co.

An outbreak of typhoid fever in Manistique village in April, 1896, and an outbreak in Manistique township from August to December 1, 1896, were traced to an infected well in Doyle township, as were two cases in this township. Dr. Frank Rainie, health officer of both Manistique village and township and attending physician in the first two cases in Doyle township, wrote in regard to these outbreaks as follows:—

"Last winter between January and April I attended two typical cases of typhoid at Peter McGregor's farm, 14 miles from town, in Doyle township. The origin of those we were unable to tell as they had come from Canada the previous fall, and went to camp in woods to work. They reported that the water which they used at the cook camp had a disagreeable odor when they would pump it. The cook and her brother, who helped her, were the two cases mentioned. They were brought to Peter McGregor's farm where there was a vacant house and there stayed until well. They were instructed about the stools, but am told did not obey but threw them just outside the door, which is about 20 or 30 feet from the well, which is a drive well, and could not have been infected up to this time, of the coming of these people. After the two recovered, their sister, who had come from Canada to nurse them, was taken

down. She was brought to town, treated by myself and properly reported to Dr. Dube, health officer at that time, and all precautions taken. These three cases all recovered. Were as typical as you see typhoid, and run their full course.

"2. The vacant house that these people occupied at the McGregor farm belonged to a family named Johnson, who were working in the wood at that time. When the "break up" came in the spring, the Johnsons moved back to their house, thoroughly renovated it, and lived there about a month when Mrs. Johnson's (who is a daughter of Mr. Morningstar) little boy was taken sick, then Mrs. Johnson herself. These Dr. Burdick treated, and were mild cases. The Morningstar family, eight or ten in number, had all visited their sister and daughter, Mrs. Johnson, and had drank at the Peter McGregor well. They have all without one exception been sick. Dr. Burdick attended them. He did not pronounce it typhoid. I believe they were all mild cases of typhoid. Hiram Lake, who died, lived a short distance from Morningstar's, the Morningstar family living 7 miles nearer Manistique than the McGregor farm, and in Manistique township. There is no history of him drinking at this well. I am health officer of Manistique township, as of the village, and investigated the Morningstar cases and all instructions and precautions taken.

"Peter McGregor had been to his farm "haying," drank of the water, was taken with a grave type of typhoid and died.

"There have been other families used the water but no sickness as yet.

"The well is a driven or drilled well (very deep) but the iron piping does not come to within 4 feet of surface where a square box fills its place. It looks plausible to me that the stools being thrown out may have been washed into the well with the thaw in the spring, and the people were there at proper time to be infected, while from constant use of well, such as it is, it might be possible all infected matter be pumped out by this time.

"If these eight cases did not get it from the McGregor well where did they? They were not at the camp. While in McGregor's case himself may have gotten it either place.

"These are all we have had in Manistique and vicinity, and I think the facts in the case warrant the expense and trouble to investigate the McGregor well. * * *

"As to the village of Manistique we have had none only as brought from this district."

There were 16 cases of sickness and 2 deaths from this disease that in all probability would have been prevented had the proper sanitary precautions been taken in the first cases on the McGregor farm.

Typhoid Fever in Union City Attributed to Contaminated Water-supply.

A letter from Dr. S. B. Frankhauser, health officer of Union City, Branch county, is as follows:—

"What would you advise us to do in regard to the city drinking water of Union City?

"About six weeks ago we sent a sample to Ann Arbor for examination. I took it from a fountain on the *main pipe* about 60 rods from the wells. Analysis revealed a bad condition. Chemically, the report was not bad, but the water contained germs which were developed on cultures and afterwards injected into animals, causing death in 20 hours.

"Now as you know we had seven cases of typhoid fever besides other fevers and sickness and every one had either drank this water exclusively or had drank it occasionally.

"Quite a considerable dispute has arisen.

"We have pumped it away for several days and I would like to have it examined again, but many of the council oppose it on account of the \$25 expense."

Secretary Baker replied, October 22, 1896, as follows:—

"I am sorry to hear of the very bad condition of your water supply; it is apparently very much contaminated. It is possible that the water may in time become safe again, this could be ascertained by bacteriological and chemical examinations from time to time. In the mean time your local board of health should urge upon the people the boiling of all water used for drinking purposes. And, in case the contamination does not disappear, your city should look for another source of supply. A contaminated water-supply is exceedingly dangerous, and will soon be more costly to the city by reason of the sacrifice of human lives than the money value of a whole new plant.

"I hope your local board of health will take vigorous steps to protect the people, even if it becomes necessary to forbid the use of the water. I think your local board of health might declare the water

supply a nuisance and dangerous to the public health. I send you herewith a pamphlet in which I have marked parts relating to the subject of nuisances."

December 20, Dr. Frankhauser again wrote to Secretary Baker:—

"You will remember we had during the months of Aug., Sept. and Oct., seven cases of typhoid fever. * * *

"About that time I sent a sample of water to Ann Arbor for analysis and the report we received told us that we had bad water in Union City. Later I tried to have another sample sent, but could not get the harmony of the Board or Council.

"Now we have two cases of typhoid and last night I heard of the third.

"The public wells are only 30 feet deep and are located in the lowest part of the town.

"I would be pleased if you would write me a letter of advice which I can read to the board."

Secretary Baker's reply to this letter was as follows:—

"Water that has once been proved to be contaminated and dangerous is quite liable to continue to be dangerous. In a place the size of Union City it is generally not safe to drink unboiled well water at a time when typhoid fever is present in the village. Your board of health should investigate and find out from what source the typhoid comes; whether from the general supply or from the wells. It would be difficult to secure an examination of the water from every well, but the water (sample) from the general supply should be examined and if found polluted and to contain the typhoid germs, it should be condemned and none drank, etc., unless boiled. Water may not at a certain place or time be found to be dangerous when a sample from another place or from the same place at a subsequent time, will be found to be infected. In a village with a reasonably safe general supply, the local board of health should make every effort to induce the people to abandon the use of wells. At the time of typhoid fever, it is best to boil all water used for drinking purposes, and especially if the purity of the water is suspected. I hope your board will take immediate action."

Typhoid Fever in Menominee City, Menominee County.

A letter, dated April 16, 1896, from Dr. John F. Hicks, health officer of Menominee city, transmitted a newspaper clipping as follows:—

"Notice from Health Officer.

"An unusual number of cases of Typhoid Fever have been reported to this office during the past four days. I would therefore warn all persons in the city to use no water for drinking purposes unless it has been previously boiled, pending an investigation as to the cause of the outbreak of Typhoid Fever.

"JOHN F. HICKS,

"Health Officer."

April 18, 1896, the customary "Blue" letter urging action for the restriction and prevention of typhoid fever, was sent to Dr. Hicks, as were also copies of the document on this subject issued by the State Board of Health.

The following letter, dated May 7, was received at this office from Dr. Hicks:—

"The first reported case of typhoid fever was reported Apr. 14, and up to Apr. 19, we had 50 cases reported, which I think was a slight excess as some of the cases reported I do not believe were typhoid. From that time to the first of May we had 15 cases reported, since May 1, we have had one case reported. So far we have had 11 deaths—with many patients very sick yet. I warned every one to use boiled water only, at once when the reports began to come. I sent at different times seven samples of our water, six taken from the mains and one from the middle of the river ten feet below surface. We have satisfactory proof that the river water is in our water mains. Dr. Vaughan found by two of the samples (the one from the river and one from a faucet in the middle of the city) the white rats were killed, and pronounced four of the samples dangerous and unfit for drinking. Our city is unusually clean. I at once employed a sufficient number of men who delivered at every house in the city inside of three days a circular giving full instructions as to the proper manner of cleaning premises and disinfecting privy vaults.

"I called upon the mayor to call a special meeting to consider the matter inviting the Water Co. to be represented. Meeting was to be called to-morrow night, but the Water Co. asked for time to send to Ohio for their attorney, which was granted. I am going to advise the condemnation of the bay water as a source of supply, as the river contaminates it for more than five miles from shore while our intake pipe is only 2,000 feet out, and recommend artesian wells. You say you will aid us if we require it. In what way can you aid us? We are afraid we may have some trouble with the Water Co. The time has come when the river water is dangerous, and the danger will continue to increase. The discoloration of water in mains proves that river water is there. Please answer by return mail as I wish to have your reply before the special meeting of the council, which will be as soon as the Water Co.'s attorney gets here."

Secretary Baker, in reply, commended Dr. Hicks for his prompt action in warning the people not to drink water not boiled, etc., and stated that not having the necessary data relative to the present source of water-supply nor relative to the proposed artesian supply, it would be impossible to make a satisfactory reply by return mail.

In a letter, dated May 11, Dr. Hicks wrote:—

"Seeing that only 10,000 pamphlets had been printed and knowing that they were sent broad cast all over the State, I feared that you would not have enough to be of any particular benefit to us, besides the delay in getting them, I had at once 3,000 circulars printed, containing the most valuable portions of your pamphlet, and in less than two days had one delivered to every house in the city. * * * The outbreak was at once stayed. What influence the boiling of the water and other measures taken to prevent the spread of the fever had I am unable to say as yet.

"As to getting our water supply from artesian wells that will be considered at the meeting spoken of. * * * I will also have blanks filled out today and forwarded. We have had four more deaths since I wrote you, but no more new cases. * * *"

The following notice, which is a copy of the notices distributed throughout the city of Menominee, was inclosed in the above quoted letter:—

"HEALTH OFFICER'S NOTICE."

"MENOMINEE, MICH., April 23, 1896.

"DEAR SIR:—Our city is threatened by an epidemic of typhoid fever, nearly sixty cases with three deaths having been reported at this date. While some of these reported cases may not be typhoid, there are enough that are to cause alarm, and it is the duty of every householder of our city, not only for the good health of the people at large, but for the safety of the health and lives of the members of his own immediate family, to take prompt measures to prevent the further spread of the fever. Therefore you are requested to put your premises at once in the best possible sanitary condition. Fire is our best disinfectant. You will please rake up and burn all unsanitary material on or about your place. That which cannot be burned must be removed at once to the dumping ground. All water closets or privy vaults must be carefully attended to, and made as clean and sanitary as can be. To clean privy vaults use two gallons of water containing four ounces of the best chloride of lime to the gallon for every cubic foot of contents of privy vault.

"I would advise to burn all kitchen garbage in range or stove. This is the best way to dispose of such material, and it can be so disposed of in any ordinary family.

"All pools of stagnant water must be either drained or filled.

"In a few days after the presentation of this notice, you will again be visited by a sanitary inspector, and in all cases where the request has not been complied with, steps will at once be taken to enforce a compliance.

"SOME FACTS CONCERNING TYPHOID FEVER.

"Typhoid fever is a dangerous and protracted disease, terminating fatally in Michigan in about 1 case out of 10. The greatest number of deaths is in persons in the prime of life, but persons of all ages have the disease. It is believed to be a contagious fever, caused by a specific germ.

"Filth and bad sanitary condition of premises generally increase the danger of spreading typhoid fever. Good water supply, water closets and sewers generally restrict it.

"The time between receiving the poison of typhoid fever into the system and becoming sick therefrom varies, but is about eleven days; sometimes longer. Where the fever exists great care should be

taken to disinfect all discharges from the patient. Burn them, if possible. The urine of typhoid patients contains large numbers of the germs of the disease. All garments upon which any urine may have come should at once be disinfected before becoming dry, so that the germs may not float off into the room as atmospheric dust.

"While typhoid is not so contagious as some other diseases, if care is taken to keep the patient and surroundings clean, yet it is sometimes transmitted through the air; also directly from one person to another. It is wise, therefore, for all who are not actually needed to attend the patient, to keep away from the premises.

"Nurses and attendants should observe perfect cleanliness, the hands of nurses may become contaminated by the poison of the disease. A good supply of towels and basins, one containing a solution of chlorinated soda, chlorinated lime or the zinc solution, and another for plain soap and water should always be at hand and freely used.

"JOHN F. HICKS.

"Health Officer."

Secretary Baker acknowledged the receipt of this notice, which he highly commended, and stated to Dr. Hicks the possibilities, so far as aid which this office could give to them, and also stated the limitations to which this office was subjected because of lack of necessary funds.

July 13, Secretary Baker again wrote to Dr. Hicks thanking him for the copy of his report to the city council, and explained to him the necessity for reports to be made to this office on the blanks sent out for that purpose. In his report to the council Dr. Hicks recommended the use of artesian wells and explained at length his investigations of the subject of such wells, especially with reference to their practicability for Menominee.

The following extracts in regard to Dr. Hicks' investigation of the cause of this outbreak of typhoid fever are taken from this report:—

"I visited, as you know every house in the city where typhoid fever was reported to be. The sanitary conditions were in many cases, not only good, but all that could be desired, and nearly all good and in none very bad. Therefore the unsanitary condition of our city could not be considered as a cause. I also found that no great number took milk from the same milk man, but that milk was supplied to one or more houses by every milk man furnishing milk to the city. Therefore milk as a conveyor of the disease was ruled out. I had no reason to believe that atmospheric causes had anything to do with it. I found that the disease was wide spread, reaching from Taylor Ave. on the North to the iron bridge on the South, and from the shore of Green Bay to the western part of the fifth ward. Therefore the outbreak depended on some general, and not a local cause. I found that all the houses where typhoid fever existed used city water. The houses where the fever was found alike on the highest and driest parts of the city as well as the lower portions. I found it in all classes of houses, from the modest cottage to the finest residence in the city and among all classes of people, the poor, the middle class, and the rich. Weighing the above points carefully, and knowing that in a great majority of cases (as stated above) the poison of typhoid fever is conveyed by means of the drinking water, I therefore turn my attention to the water supply. I sent three samples of water taken from mains in different parts of the city to our State university and asked them to examine it for typhoid bacillus. The answer came that they were unable to find the typhoid bacillus in the water. I then sent four samples more of the water, one from the center of the river at a depth of ten feet from the surface and three from the water mains. Two of these samples, one from the river and one from the mains of the city were reported by Dr. V. C. Vaughan to contain pathogenic germs, and unfit for drinking purposes even if it did not contain disease producing germs. He also reported that all four samples were unsafe drinking water, and instructed me to use only water for drinking purposes that had been boiled.

"On further examination of our water supply I find that the two cities, Menominee and Marinette empty their sewage into the river and bay all from Marinette emptying into the river, and that from Menominee being divided between the river and the bay. One of the main sewers of Menominee enters the bay at Fish Court just south of the coal dock. The amount of water passing through this sewer impregnated with sewage is more than two hundred thousand gallons in twenty-four hours. The mouth of this sewer is 3,600 feet from the entrance of the intake pipe. Besides this sewer there are several private sewers entering bay at points still nearer the mouth of the intake pipe. It is also a fact that

the drainage from our cemetery enters our main flushing sewer at the southeast corner of the cemetery on Stephenson Ave. A competent engineer informs me that the amount of water from the cemetery entering the flushing sewer is in the neighborhood of 100,000 gallons every twenty-four hours. This drainage from the cemetery passes to the river and bay through our sewers. One explanation of our epidemic this spring, I think is, that it is only lately that any large amount of sewage has entered the river, the sewer system of Marinette being comparatively new. The river last fall being lower than usual and many of the small streams tributary being dried up, when the ice came the volume of the river was unusually small. The frost would prevent any large quantity of water entering the river during the winter months. The stream therefore would be more sluggish near the mouth where the sewage was emptied into it, giving the solid matter in the sewerage a greater chance to settle in the river, and not so likely to be washed out. When it began to thaw the volume in the river increased producing a more rapid current, and as thawing began in the early part of March continuing through March to April, the river would be more or less flushed and the covering of ice would allow the natural sweep of the current to pass near our intake pipe, carrying with it the deposited sewage of the winter, and as it is well known that the river water enters our water main, there is at all times a danger that any sewage contained in the river water will be carried into our main, and wherever there is sewage in water there is danger of typhoid infection. Public water supplies can not be any more disinfected than can a well. Where care is exercised in excluding sewage from a source of water supply the danger of typhoid fever is almost none."

Mr. H. F. Dunham, civil engineer of the Menominee Water Co., in a letter, dated July 7, 1896, inclosed the following, which he stated was taken from his report to the president of the Menominee Water Co.:—

"On the 14th day of April, 1896, a case of typhoid fever was reported to the health officer of the city of Menominee and between that day and the 19th of April over fifty cases were reported. Of this number thirteen resulted fatally. Subsequently to the 20th of April but 5 or 6 were reported and none after May 1st. Investigation did not disclose the fact that any considerable number of the people who were ill obtained milk from any one source and their residences were pretty evenly distributed throughout the city.

"Naturally, the water was suspected of being the conveyor of the disease. Samples were taken for examination on the 15th of April and again upon the 22d of April. The first samples were reported upon favorably; the second samples were reported on unfavorably.

"At the time the second samples were taken the water was somewhat discolored and bore evidence of the presence of a larger proportion of river water than it had at any time during the season or for years past.

"Before entering upon a discussion of the subject it may be well to outline briefly the general conditions. The dock and government pier at the south end of the city extend into Green Bay a distance of 1,000 feet. The depth of the channel at the river mouth is 17 feet; two thousand feet out about 26 feet, and four thousand feet out 30 feet, and seven thousand feet out 48 feet. About fifteen hundred feet north of the mouth of the river there is an intake which supplies Marinette with water. This is located about 1,500 feet from the shore in a depth of 26 feet. About 6,000 feet north of the mouth of the river and 2,000 feet from the shore is the intake of the Menominee Water Company in a depth of about 22 feet of water, and from this point in a line parallel with the bay shore the depth of the water gradually diminishes. The bay shore from the mouth of the river for a distance of two miles is occupied at irregular intervals by wharves and docks that project from one to four hundred feet into the bay. North of the water works station on the bay shore are several docks. Two of them are known as the Nowack and the Furnace docks. Between these two docks there discharges into the bay a sewer, which will be referred to as the State Street sewer. With the exception of what is discharged from this sewer and from overflows and residences upon Main Street, the sewage of Menominee is carried to the Menominee river.

"The direction of currents in general on the Menominee shore is from north to south, probably because of the fact that the prevailing winds are from a northerly direction and because the outward flow of the river induces lateral currents. The bay usually freezes over about the first week in January and continues frozen until near the middle of April. During this period it is not reasonable to believe that the winds affect the movements of the water in the bay.

"When two or three cases of typhoid were reported in the winter of 1895, considerable patient work was done at the station to determine the direction taken by the river water after passing into the bay.

Samples were obtained at different distances from the mouth of the river in the direction of the current and also in directions at right angles thereto over an area of the bay of two square miles. * * * Comparisons were made with water that was then being pumped at the station by aid of the color test, using tubes about eighteen inches long, which gave results delicate enough to show the yellow tint of the river water when but a very small portion of the river water was present. It was thus proved that the great body of the river water passed out under the ice without affecting the water but a slight distance north of the river channel as extending into the bay. * * *

"During the last five days in March, 1896, the weather was very warm, averaging 42 degrees in the shade at the station (the average being obtained by noon and midnight readings), and this was accompanied by a heavy rain on the 31st. At this time the bay was covered with ice which had not moved to any appreciable extent during the winter. On the 1st of April the ice along shore was loosened and for eight or ten days there was a space of open water varying in width from nothing to 50 or 60 feet substantially parallel with the shore line. This was occasioned by the rapid melting of the ice next to the shores. On the 14th of April the main body of the ice drifted further to the east and passed out of sight. From that time on the bay remained open.

"Since the examination of the water in 1895 as above mentioned it has been the practice of those connected with the water works to notice the color of the water at any and almost all times, and such attention as they have given to this matter makes it natural for them to notice slight differences in color which would not be apparent to people ordinarily. During the first half of April or previous to the final moving away of the ice sheet, no indication of the presence of river water in the supply had been observed by any one.

"It is a well known fact that a period of 12 to 15 days intervenes between the time that typhoid fever germs are taken into the system and the appearance of the disease. And it is beyond question if the disease was caused by water, that that water must have been delivered through the pipe system when the supply was practically free from river water.

* * * The sewer which discharges near the Furnace property takes the drainage from three or four streets above Stephenson avenue and is so constructed that sewage from Stephenson avenue passes out through each of three different sewers into the State street sewer and then to bay near the Furnace dock. As recently measured, the amount so discharged was in excess of 400,000 gallons per day. * * * The sewage delivered at this point on the bay shore during the cold weather would naturally become frozen. That the entire basin between the two docks, comprising an area of about 1,200 feet in length and about 400 feet in width, partially locked in from winds and currents, should become polluted is very evident. * * * Sewage would be left to freeze and the silt and foul matter previously deposited in the shallow water would be frozen into the ice as the thickness of the ice increased.

"The contour of the lake bottom is such that from the outfall of this sewer the line of maximum slope or descent leads almost directly to the water works intake.

"The temperature of the bay water in winter varies from a fraction above 32 degrees to 33 and possibly 34 degrees. This is the temperature at the bottom at the point from which the supply is taken.

"With these established facts there should be associated two other facts not less general in their character but less evident. * * * The specific gravity of sewage is greater than that of water.

"The specific gravity of water is the greatest when the temperature of the water is 39 and 1-10 degrees. This last mentioned fact means that if you have a tank or body of water at 33 degrees temperature and apply heat to the surface and raise the temperature of the surface water to 36, 38 or 39 degrees, this heated water will sink to the bottom and the 33 degree water from the bottom will rise to the surface and be heated in its turn. But if you heat the surface water when the temperature of the whole body of water is 39 degrees or more, no such change will occur, the heated surface water will remain at the surface and only such heat as may pass down through the heated stratum or layer will affect the temperature of the water below. * * *

It remains to point out a simple method by which polluted water under these perfectly well established conditions and in accordance with known laws could reach the intake. That portion of ice near the land is the first to melt because the sun's rays are more effective on account of the proximity of the land and because of the shallow depth. Warm rains and the warm sunlight upon this strip of open water and in addition the continual discharge of warm water from the sewer would increase the quantity of polluted water near the shore that was warmer than the ordinary bay water. The course followed by the heavier sewage (that is, heavier than its own bulk of water at the same temperature), and by the warmer and therefore heavier water in relation to the adjoining water in the bay would be that precisely that which any heavier liquid introduced at the same point on the shore would pursue. That line or course would be the line of maximum descent

which as above mentioned, slopes toward the water works intake. It is not so easy to think of a stream of warmer water as flowing beneath a body of colder water, but this is merely because we are more accustomed to higher temperatures. It is a simple matter of specific gravity. It is true that such water would upon coming in contact with colder water, lose some of its heat, but the water to which this heat was imparted would be increased in density and would follow the same laws thereafter so that the whole transfer or movement of such a submerged stream might be compared to the downward course of a pebble upon a slope where some of its force would be imparted to the pebbles with which it came in contact but only to cause them to move in the same direction.

"This condition of unstable equilibrium as it might be called, could last but a short time. Just as soon as the temperature of the bay water had been increased to 39 degrees and two or three degrees may have been sufficient for this, water of a higher temperature would float upon the surface to be purified by the winds and waves.

"Naturally the question arises, why should not the sewage from the river reach the intake in the same way. The answer is simply this. The sewage at the river is discharged into deep water where it can at once settle to the bottom without freezing into tons of ice to be suddenly melted afterwards. When the sewage reaches the mouth of the river it is more than a mile from the intake and at a lower elevation instead of being eighteen feet above that intake. Then the current of the river as well as the force of gravity, for the bottom of the bay slopes away from the river entrance, would tend to carry the sewage further into the bay. In short, the very laws which would control the flow of sewage from the shore and determine its direction to be toward the intake, would insure its flow from the mouth of the river into deeper water and away from the intake. Besides the causes above mentioned as influencing the flow of sewage, the fact that a large quantity of water is taken daily from the bay at the intake and a large quantity of sewage is emptied into the bay at the sewer outlet should not be overlooked.

"One test of any theory is the relation it bears to many known facts. The Marinette intake is quite near the river. It is not in more shallow water than the Menominee intake. It is outside of a straight line joining that intake and the end of the pier. If the trouble came from the river, why did not Marinette suffer most instead of none or scarcely any?

"It is evident that the cause of the outbreak, whatever it may have been, was of brief duration. No other single fact would be so sure to lead an expert to look for the cause at the nearest point. * * *

"I might add further that in many fever cases, occurring where there were sewerage connections, polluted matter must have been carried directly into the river. But we are not aware that any additional typhoid fever cases were caused thereby."

July 21, Mr. H. F. Dunham wrote to Secretary Baker, in part, as follows:—

"I see I have partially answered the question which you asked in regard to a possible source of contamination by way of the State Street sewer. In further reply I would mention the fact that Main Street, which I think you will be able to find on the map as nearly parallel with the bay shore and quite near to it, is upon a sandy ridge somewhat higher than the ground to the west of it. That lower ground and in fact the entire area upon which the city is built, has been a kind of battle ground with typhoid fever ever since the town was established here, and the use of well water throughout the so-called low district, in which is comprised the entire area draining out at the State Street sewer, would if proposed, be speedily prohibited by the health officer or any physician in the city. The ground is a fair variety of quicksand to a depth of fifteen to twenty feet, where it rests upon hardpan. No portion of it is more than a few feet above the level of the bay. You may be able to make out upon the small map the location of Stephenson Avenue, which was referred to in my former letter. The main sewer through this avenue takes water from the river at a point considerably above the general level of the city and this water is used for flushing practically the entire sewer system. On the south of the avenue and adjacent to it is an old cemetery from which one or two thousand bodies were removed three or four years ago, and on the north side of avenue and near the river there is a new cemetery, to which the bodies were transferred. The drainage of ground water from a large portion of this new cemetery is led directly into the Stephenson Avenue sewer. The entire sewer system of Menominee shows many indications of not being water-tight, that is, the quantity of water discharged seems greatly in excess of the amount you would naturally expect from a given number of house connections and the presence of quicksand in the sewers has already led to much additional work in flushing and taking care of them. These facts indicate to me that the sewers are continually removing a large amount of ground water although they are not intended to serve that purpose, and as the ground water, as above indicated,

would be looked upon with great suspicion if taken from a well, it seems quite probable that infection might reach the sewers from a strongly polluted soil as well as from the ordinary house connections. The condition of both Main and State Street sewers when I came here in May was certainly very bad. They had not been flushed out for an indefinite or unknown period, and it was the work of days to dislodge the solid matter which had accumulated in them even where large streams of water from the water works were used in addition to a supply from the river.

"You will not gather from this letter that I am criticising the city's management of its sewers or seeking to do more than state the most prominent facts and those which I think are known and well recognized by all familiar with the conditions. Of course, I do not think it was wise or right under the circumstances to have any portion of the sewage discharged upon the bay shore and I think the present conditions of sewerage should be changed without delay."

In accordance with a request, dated August 5, 1896, made by Dr. Hicks at the joint recommendation of the city council and the Water Company, Secretary Baker visited Menominee, and in company with Mr. Benzenberg, city engineer of Milwaukee, examined the water plant, source of water-supply, and proposed sources, the sewerage system and its relation to the water-supply, and, generally, the question of best water-supply for Menominee.

Upon being urged by Dr. Hicks to send in a report of this investigation, Secretary Baker sent in a preliminary report, and wrote Mr. Benzenberg to that effect and enclosed him a copy. Mr. Benzenberg replied, September 26, 1896:—

"Your letter of the 18th inst., stating that you had filed a preliminary report with Dr. Hicks on the Menominee Water Works question has been duly received. I suppose they are getting out of patience in not having the report filed before this time, but it is slow business to get at the data that I want. I am satisfied that the only remedy to be recommended in the Menominee case, is the putting in of suitable mechanical gravity filters, whereby at least 90 to 95% of the bacteria may be removed from the water. Such a plant, outside of the cost of the building and foundation, capable of supplying one and one-half to two million gallons of water every day, will not cost over \$12,000.00

"The artesian water, I am satisfied, is not to be recommended for general use on account of its hardness. The river water above, is not suitable, and by extending the water main in either direction from its present terminus, does not seem to be going to benefit the condition one particle.

"I find upon examination of the United States lake survey maps that the conditions north of the harbor at Menominee would indicate the existence of an eddy current along the shore towards the south. I have had the Water Works company people make a number of current observations, which they are doing even at the present time, in order to establish the fact whether there is or is not an eddy along the shore north of the harbor. If such is the case, it seems to me it precludes the possibility of getting any purer supply by extending the pipe even in a northward direction, parallel to the shore.

"I feel somewhat discouraged in not being able to find an absolute solution of the water problem aside from the filtering method. If a filtering plant is introduced, provisions will have to be made to draw directly from the present intake in case of extensive fires or conflagrations, because it will be impracticable to provide a filtering plant large enough to supply water as needed in case of large fires. That will mean the filling of the pipe system with unfiltered bay water, but I do not see how that can be avoided. Besides, the bay water, I do not think, is at all times objectionable for domestic purposes, only at such times as the currents or winds will drive the polluted water, whether from the shore or from the river to the intake. If a fire should occur during such time and the pipes are filled with water directly from the bay, the only resource would be to flush out the pipe system with filtered water after the conflagration is over.

"I submit these points to you and would like to have you express your views as to the propriety of submitting such recommendations as to the introduction of filters and the conditions that may arise in case of fire. As soon as I hear from the company with reference to the current observations, I will write you again."

October 5, Mr. Benzenberg wrote Secretary Baker, in part, as follows:—

"I have not received, as yet, all the information that I wanted in connection with the currents or analyses of water, but do not think that it would make any difference in the character of the report.

I have therefore mailed the report to you herewith, hoping you will approve of the same. I have here and there made a few changes and additions to the report as you sent it to me and I have added a few analyses that I have received and made an appendix of all the reports upon the analyses of water. I have used most of your report, only here and there leaving out a clause which I do not think will affect the strength of the report. I have signed the report and if you approve please sign and forward it at once to His Honor, Mayor Wells of Menominee.

"I will send you a duplicate to-morrow for your signature to be sent to the Water Company, as they are entitled to a report I take it as well as the city.

"Should you wish to make any corrections, do so freely and return the same at your earliest convenience."

The following is a copy of the preliminary report previously mentioned, no copy of the final or completed report being at hand:—

"To the Honorable, the

"Mayor and City Council,

"Menominee, Michigan.

"Gentlemen:—I respectfully submit the following:—

"PRELIMINARY REPORT OF THE EXAMINATION OF THE WATER SUPPLY OF
"MENOMINEE, MICHIGAN.

"This examination was undertaken in compliance with the joint request of the City Council and the Water Company of Menominee.

"The request included: (1) The question of the source and cause of the outbreak of typhoid fever in the spring of 1896, (2) whether or not Green Bay is a safe source for a water-supply, (3) what is the best available source for a water-supply, and (4) what is advisable to do with reference to a safe water supply?

"The great importance of these questions has called for careful investigations and study of the existing conditions, and comparisons with experiences in other localities, and with facts established by science.

"1. From the evidence collected it is my belief that the source of the outbreak of typhoid fever in Menominee in the Spring of 1896 was the city water-supply; that it is quite probable that previous to the outbreak the sewage-contaminated river water reached the intake to the water supply in an unusual proportion. This may have occurred because of an unusual volume of river water flowing around toward the intake, on account of some temporary lessening of pressure there compared with other parts of the Bay. Comparison of the examinations of waters Nos. 4 and 6, of samples supplied to Prof. Vaughan and collected at Menominee about April 21, (sample 4 being taken from the river at the bridge, sample 6 near the center of the city), show that on that day river water gained access to the general water-supply, and that the water-supply then contained germs capable of causing death to animals. That no unusual increase of typhoid fever resulted may have been because the pathogenic germs were not sufficiently numerous to cause an epidemic, although they were there in sufficient numbers to be cultivated in the State Laboratory of Hygiene, and to cause death to white rats, as is shown by Dr. McClintock's report.

"It is quite possible that just preceding the outbreak of fever the public water-supply was contaminated by sewage going directly into the Bay as at Fish Court.

"2 My belief is that the water from the present water intake in Green Bay is not safe to use for drinking purposes unless the water is so treated as to destroy or remove germs of disease, which may at any time be present.

"Bearing upon this question, it appears that previous to the establishment of a general water-supply, the drinking water was obtained from wells and from the Bay at the shore, and that typhoid fever was exceedingly common in Menominee; that on the introduction of water from 1,000 feet out in the Bay the typhoid fever was greatly lessened, and after the intake was extended to 2,000 feet the fever was still further lessened, and so remained until the year 1895, during which year ten deaths from typhoid fever were reported, and in 1896 during the first six months of which 19 deaths from typhoid fever have been recorded. And it seems to be established that the Bay water was the source of the disease. These results are in accord with the facts,—as to the comparative purity of the Bay before the sewers were so much used and as to the constantly increasing pollution of the Bay, due to the increasing population of Menominee and Marinette, and the increasing proportion of inhabitants whose excreta are taken into the sewers and poured into the river and then into the Bay. If the inhabitants increase

still more, this danger will increase correspondingly; and even if the numbers of inhabitants are not increased, probably the proportion of the inhabitants who come to use the sewers will be increased, therefore the fouling of the Bay, and the danger in the use of the Bay water, must be expected to increase. unless the water is so treated as to destroy or to remove the germs of disease.

"3. I have considered the plan of extending the intake pipe still further into the Bay. One difficulty in the way of this is that the most frequent current of the river is, apparently, from the mouth of the river northward in the direction of 'Death's Door,' so that if the pipe is extended it will probably intercept the river water, unless the pipe is extended very far out into the Bay, in which case, although it will probably be safer than where the intake now is, it does not appear that water entirely above suspicion at all times would then be obtained. In fact such a comparison of the best water in the Bay with the water in Lake Michigan as may be made by a person standing in the bow of a steamer from Menominee through Sturgeon Bay to Lake Michigan, demonstrates the fact that in color and in suspended matter the water in the Bay is far in excess of that in Lake Michigan.

"I have considered the plan of depending upon artesian wells. Undoubtedly artesian water ranks highest in safety to health, so far as relates to any specific disease such as typhoid fever. If a sufficient quantity of water which could be used for all purposes could be obtained from a reasonable number of artesian wells, the problem would be solved to my satisfaction. Unfortunately, however, all of the analyses which I have been able to gain a knowledge of show that the water from artesian wells in Menominee and vicinity contain a large amount (over seventy grains per gallon) of mineral matter; and that mineral water consists largely of the sulphates of lime and magnesia, and is of such a nature as to make the water unsatisfactory for many purposes, tending to form solid scale in boilers, water-backs and pipes, and to make it impracticable to use for laundry purposes. Some hard water can be made comparatively soft by treatment with lime, but that is not true of such water as this, the hardness of which is in great part due to sulphates of lime and magnesia.

"Analyses, by two chemists, of water from the artesian well of Hon. Isaac Stephenson, in Marinette, are as follows:—

"Certificate of analysis of mineral water.

"Sample from Artesian well, Marinette, Wisconsin.

"One United States gallon, 231 cu. in. contains:

<i>Name of compound.</i>	<i>Grains.</i>
Potassium sulphate	1.1931
Sodium chloride.....	7.6490
Magnesium sulphate.....	10.6337
Calcium sulphate.....	42.4322
Iron Bi-carbonate.....	.5529
Aluminum Sulphate.....	2.7566
Silica.....	.3033
Magnesium chloride.....	4.0536
Magnesium Bi-carbonate.....	3.0762
Total.....	72.6506

"The water is unusual among Wisconsin water, both for the large amount of solids and for the very large proportion of the solids as sulphates.

"W. W. Daniels,

"Professor of Chemistry,

"University of Wisconsin.

"Certificate of Analysis of Mineral Water.

"Sample from Artesian well, Marinette, Wisconsin.

"Sample received July 9th., 1896. Laboratory Number, 1705.

"One United States gallon, 231 cu. in. contains:

<i>Name of compound.</i>	<i>Grains.</i>
Potassium sulphate .....	.933
Sodium sulphate.....	6.049
Sodium chloride.....	7.449
Magnesium sulphate.....	18.847
Calcium sulphate.....	28.559
Calcium Bi-carbonate.....	15.563
Iron Bi-carbonate.....	.233
Alumina.....	.104
Silica.....	.466
Total.....	78.203

"A saline water unsuitable for laundry and domestic purposes. In boilers would produce a hard compact, firmly adherent scale, and probably would tend to corrode same.

"Signed: Erastus G. Smith,
" Professor of Chemistry,
" Beloit College,
" Beloit, Wisconsin.

"Here follows report of examination of water from artesian well of Hon. S. M. Stephenson, Menominee, compared with water from Green Bay, as to hardness and total solids:—

"Beloit, Wisconsin, July 6, 1896.

"H. F. Dunham, C. E.,
" Menominee Water Co.,
" Menominee, Michigan.

"Dear Sir:—I have examined two samples of water recently received from you as to hardness and solids and would return you herewith results of same as follows:—

Sample 1.—From Menominee Public Supply.

Sample 2.—From Artesian well of Hon. S. M. Stephenson.

<i>Sample 1.</i>		<i>Sample 2.</i>	
Volatile residue.....	36.	370 Parts per 1,000,000.	
Fixed residue.....	106.	1,542 " " 1,000,000.	
Total residue.....	142.	1,912 " " 1,000,000.	
Total hardness.....	10.5	90 Degrees Hardness, Clark's scale.	

"By degrees hardness Clark's scale we understand: The power of destroying the effect of soap, measured in equivalent of grains of calcium carbonate per Imperial Gallon.

"The parts per million, above, represent:—

Volatile residue.....	2.08	21.57 Grains per U. S. Gallon.
Fixed residue.....	6.17	89.89 " " " "
Total residue.....	8.25	111.46 " " " "

"From these determinations it is evident the water from the deep artesian well is very hard for general use. As yet no quantitative determinations have been made on the salts present, but qualitative tests show high Chlorides and Sulphates.

"Respectfully submitted,
"E. G. Smith.

"Partial analysis of Water from Menominee, Michigan.

- "(1) Sample from Menominee Public Supply, June 26, 1896.
"(2) " " Artesian Well (S. M. Stephenson), June 26, 1896.
"(3) " " Menominee Public Supply, July 10, 1896.
"(4) " " Artesian Well (S. M. Stephenson), July 13, 1896.

	(1)	(2)	(3)	(4)	
Volatile Residue.....	36.	370.	52.	460.	Parts per Million.
Fixed Residue.....	106.	1542.	100.	1436.	" " "
Total Residue.....	142.	1912.	152.	1896.	" " "
Total Hardness.....	10.5	90.	9.	86.	Degrees Clark's scale.

"Signed: Erastus G. Smith.

"Waters like these artesian waters in Marinette and Menominee, containing considerable quantities of magnesia and sulphates, are sometimes recommended by physicians for use by persons suffering from rheumatism; and, being absolutely free from any of the microscopic forms of life, are especially safe waters so far as relates to typhoid fever; but it is alleged that in some persons they are liable to cause anemia, diarrhea, gravel or stone in the bladder, and goitre (enlargement of the glands in the neck).

"Prof. W. H. Corfield, M. D., of London, England, has said: 'Any water which gives even a small amount of magnesia is to be rejected. Water containing these salts causes diarrhea when drunk, and it appears to be from the presence of these salts in drinking waters that the swelling of the neck known as goitre is produced in Switzerland and other countries.*'

* *Page 16, 'Water and Water-supply,' By W. B. Corfield, M. A., M. D.

"Cornelius B. Fox, M. D., London, England, has said: 'The maximum limit of solid residue permissible is from 30 to 40 grains per gallon, but waters containing a larger amount are in certain cases permissible if the salts are quite harmless.*' In another place he says: 'Salts of magnesia and sulphates are objectionable in waters if in excess. A good water does not possess more than traces of these ingredients.†' He says: 'I have never seen a person who habitually employs a drinking water containing a large amount of sulphates that could be regarded in any sense by a medical eye as a picture of health.‡'

"Prof. Wm. Ripley Nichols of the Institute of Technology, Boston, Mass., in speaking of waters containing sulphate of lime and sulphate and other soluble compounds of magnesia, has said: 'There is no economical process which is practicable on a large scale for softening such waters, and a water which has a high permanent hardness is unsuited for general use.§'

"Elwyn Waller, Ph. D., formerly Chemist to the Health Dept., of New York city, has said: 'The amount of total solids considered as admissible in a water for domestic use has been fixed at about 50 parts per 100,000 (about 30 grains per U. S. gallon)—Wanklyn, Water Analysis, 4th Ed., p. 3, Bolley, Fischer, Kübel-Tieman, etc., etc.¶'

"From the two analyses of the water in the Isaac Stephenson well at Marinette, it appears that it contains over 70 grains of solid matter per U. S. gallon; and from the two examinations of the water from the S. M. Stephenson well in Menominee, it appears that it contains over one hundred grains of total residue per U. S. gallon.

"Very respectfully,

"HENRY B. BAKER."

In addition to the above report, Secretary Baker wrote the following letter to Dr. Hicks with the request that it be placed before the city council:—

"From this report you will see that I think the typhoid fever in Menominee, due to the city water supply, and that from this time on the present water supply will be likely to be a cause of typhoid fever unless the water is so treated as to destroy or remove the germs of disease, which at any time may be present. This means that until the entire water supply for the city shall be so treated, the only safety of the people will be in so treating the water for themselves. No person should use the water for drinking purposes, or for washing cooking utensils, milk receptacles, etc., except after the water shall have been boiled. I understand that you made this recommendation to the people of Menominee before the time of my visit to Menominee. This was in accordance with the recommendation of this Board, and of members of this Board, many times repeated. *I trust you will repeat this recommendation vigorously to the people of Menominee*, from time to time, and point out to them that the cases and deaths from typhoid fever, which are now occurring in Menominee, are entirely unnecessary, and may be easily prevented by the people themselves, if they will only act on the advice of this Board and on your advice, and boil the drinking water and take the other precautions mentioned in the leaflet (No. 124) issued by this Board, copies of which will be supplied to you for distribution, at any time.

"That it is entirely practicable to boil the water to be used for such purposes, I am in a position to absolutely affirm; because, at my own house, the water which I myself drink, is all boiled and cooled in covered water bottles or pitchers. In any ordinary family it is not difficult when the tea-kettle is boiled to set aside the water not used for tea and coffee to be cooled and used for drinking purposes. I believe that this boiling of the water is necessary in Menominee, and will be for so long as the water is taken from the present source and delivered to consumers without filtration."

There were 82 cases and 22 deaths from typhoid fever reported in this epidemic which ended in September, 1896.

*Page 22, 'Water Analysis.' By Cornelius B. Fox, M. D., M. R. C. P., etc.

†Page 111, 'Sanitary Examinations of Air, Water and Food.' By Cornelius B. Fox, M. D., M. R. C. P., etc.

‡Page 118, 'Sanitary Examination of Air, Water and Food.' By Cornelius B. Fox, M. D., M. R. C. P., etc.

§Page 285, Vol. 1, 'Hygiene and Public Health.' Edited by Buck, published by Wm. Wood & Co., N. Y.

¶Page 424. American Appendix to Parkes' Hygiene.

Report of an Investigation of the Sanitary Condition of Delray, Springwells Tp., Wayne Co.

The continued prevalence of diphtheria, scarlet fever and typhoid fever in Springwells Tp. caused the following petition, signed by eight residents of the township, to be sent to Governor Rich:—

"We, the undersigned, residents and taxpayers in Delray and vicinity, believing that our present water supply is contaminated and unfit for use, and that the prevalence of diseases such as diphtheria and typhoid fever in this section is directly traceable to this cause, and cow stables and out houses, respectfully petition you to instruct the State Board of Health to investigate the matter and make an analysis of the water and report to us the result."

Governor Rich handed this petition and the correspondence relating thereto to the Secretary of the State Board of Health for action.

After corresponding in regard to this matter with Dr. F. J. Clippert, the health officer of Springwells township, Secretary Baker visited Delray, and on the following day, December 23, 1896, sent the following report of his investigation to Governor Rich:—

"Dangers to Public Health in Delray, Wayne Co.

"HON. JOHN T. RICH,

"Governor of Michigan.

"DEAR SIR:—Relative to the complaints and petition of citizens of Delray, that the State Board of Health investigate the dangers to the public health in the township of Springwells, Wayne County, inasmuch as the petition passed through your office, you may be interested to know some of the results of my investigations made there yesterday.

"Health Officer Clippert, Supervisor Meyer, Mr. Greene, of the office of the Solvay works, Mr. Kelly, and Mr. Wagnitz of the Delta Lumber Co. office, officials of the Sulphite Fiber Co., and of the Parker rendering establishment, Mr. Delisle, Mr. Springer, Dr. Carey, Dr. Burdeno, Prof. Cody of the McMillan school and other citizens gave me cordial assistance in my investigations.

"The mortality statistics of the State Department show that the mortality from typhoid fever reported from the township of Springwells has been greater than the average for the State. It was particularly great in the year 1893. This was remembered by citizens. It was attributed to the drouth. In 1895 the typhoid mortality was rather high. The statistics for 1896 have not yet been reported. Typhoid fever is not fully reported to the local health officials. As near as I could learn from the local records of the health officer, the typhoid mortality was less in 1896,—only about ten cases and one death. This comparative freedom from typhoid fever in 1896 is attributed to higher water in the wells from which most of the inhabitants obtained their drinking water. These wells are shallow, some of them being only about eight or ten feet deep. Many of the privies are not more than thirty feet distant from the wells. The lots are narrow, and only about one hundred feet deep. The well is usually near the rear of the house, and the privy near the rear end of the lot. In many places there is a well and privy on every lot. From these conditions the danger is very great. That there has not been more typhoid fever than there has is surprising. Possibly the great abundance of the water underlying the place so near the surface of the earth has so diluted the privy leachings that fewer cases have occurred than would if the water had been less plenty and at a lower level. But such conditions cannot long exist without there being very great danger of the recurrence of the prevalence of typhoid fever; and measures should be taken, as soon as possible, for the abatement of the unsanitary conditions, by providing for a general water-supply, and for the removal of excreta by means of sewerage. Action should be taken, because unless the conditions are changed, the next year of drouth will probably bring typhoid fever. The population is rapidly increasing, the houses, privies and wells are rapidly becoming nearer together, and more of them, therefore each time the fever returns its prevalence will probably be greater, and there is reason to believe that very soon, even without there being a drouth, the whole underlying stratum of water will be so contaminated by leachings from privies that typhoid fever will be endemic—generally present there.

"There are now believed to be fifteen thousand inhabitants in the township. As a township the people cannot legally provide for a general water-supply and for sewerage. For the public safety, two propositions have been much discussed by the citizens,—incorporation as a city or village, and annexation to the city of Detroit. One of these two measures seems to be imperatively demanded by the present conditions, and especially by the prospective conditions which will necessarily follow increased density of population, where the excreta is deposited in the soil over the drinking water.

"Some of the citizens object to incorporation, for various reasons, only one of which, however, so far as I heard them, was closely related to the public health, and that was: because, if a strip of the township near the Rouge river was incorporated, it would leave another strip, (near the city of Detroit) which greatly needs sewerage, without any way of obtaining an outfall for its sewers, the natural flow being to the river Rouge. Perhaps this objection would disappear if the entire township were to be incorporated. Among the many objections to annexation, I recall one relating to public-health interests—namely that now the health service of the township is excellent, and it might easily be the same if the township were incorporated into a city or village. But if annexed to Detroit, its health service would be directed by officials at a considerable distance—about five miles, those officials not familiar with the every-day life, habits and character of the people, as the present township officials are; and the method of maintaining a 'campaign of education' of the neighbors of every house infected with any dangerous communicable disease, as is now kept up in Springwells township in accordance with the advice of and by coöperation with the State Board of Health,—this is not accepted and adopted by the Detroit board of health, therefore, although the inhabitants of Springwells might by annexation gain sewerage and a good water-supply and consequent immunity from typhoid fever, they might lose very much more, in money values and in human lives, because of sickness and deaths from diphtheria, scarlet fever and other diseases. In fact, one of the greatest dangers to life *now* in Springwells consists in its proximity to Detroit, and in the very great liability to contract diphtheria, a *strictly contagious disease* which has not been shown to have any necessary relation to sewerage and water-supplies, and which cannot be restricted except by the coöperation of all the people, which coöperation cannot be obtained except by the 'Campaign of Education' previously mentioned as recommended by the State Board of Health, but which is not yet adopted in Detroit.

"From a public-health stand-point, therefore, it seems to me that the best measure for the public safety, considering not only typhoid fever but also other dangerous communicable diseases, is incorporation as a city or village. This would retain local-self-government. But it is certainly very important that something be done to lessen the danger of typhoid fever in Delray; and, in order to have sewerage and water supply throughout the township, either incorporation or annexation is necessary.

"Very respectfully,

"HENRY B. BAKER,

"Secretary.

"Office of the Secretary of the State Board of Health, }
"Lansing, Dec. 23, 1896."

Report of an Investigation of Typhoid Fever at Downington, Marion Tp., Sanilac Co.

An outbreak of typhoid fever in Marion township, which commenced, August 1, 1896, resulted in 17 cases and 5 deaths. The source of contagium was reported by the health officer, Dr. J. G. Totten to have been the water supply and unsanitary conditions. The following is a report of an investigation of this outbreak made by Dr. Geo. H. Cattermole, as a representative of the State Board of Health:—

"To the Secretary of the Michigan State Board of Health:—

"In response to a letter from W. A. Mills, prosecuting attorney of Sanilac county, asking that some person be sent by the State Board of Health to investigate an outbreak of Typhoid Fever in the unincorporated village of Downington, I was directed to visit that locality, and for that purpose I left Lansing on Tuesday night August 25, 1896.

"I arrived at Deckerville, an adjoining village to Downington, on the morning of August 26. In Deckerville I met Dr. Vincent who had been attending the greater number of the cases of sickness in Downington.

"In company with Dr. Vincent I drove to Downington, where I saw his patients and received the following case-histories from them:

(1) Mr. Grice, aged 40, taken sick August 15, with severe pain in the back, head and limbs. Fever lasted one day, when it was broken by the use of medicine.

(2) Grice child, girl eight years old, had vomiting and fever for one day.

(3) Mrs. Grice, a chronic invalid (uterine trouble), sick in bed now.

"The well on the Grice lot is situated between the dwelling and outhouses. It is a well 16 ft. deep and the water in it is about 5 ft. deep.

(4) Mr. Haines, aged about 50, was sick about two weeks ago (Aug. 12) with severe headache and pains in his limbs, which lasted only a few days.

(5) Mrs. Haines, aged 45, taken sick about Aug. 12, with chills, fever, headache, and pains in the back and limbs. Has had fever at intervals of two days; is still sick. The trouble is thought to be malaria.

"Their well water is very poor. It is from a bored well, 33 ft. in depth, with a wooden casing, which has been in for a number of years, and is decaying so that water pumped from the well contains particles of the wood. The stage of water in the well has been very low all the summer. The well is 10 ft. from the house, privy less than 50 ft. from the well, a very foul barnyard is less than 75 ft. from the well. Mr. Haines has thrown lime into the well and about the curb, thinking it would purify the water.

(6) Jas. Gallaway, boy aged 10, was taken sick about Aug. 15, with nausea, vomiting, high fever which lasted six days, cramps in the bowels so severe that he screamed constantly with pain; there was diarrhea, and he had nosebleed at short intervals for three days. Prostration was so great, in his case, that he was thought to be dying a few days ago, but is now much better.

(7) Mrs. Gallaway, mother of the boy, has been sick for three days with tonsillitis.

"The Gallaway family live over a butcher's shop. (I found the shop in a very good sanitary condition). Their well is 32 ft. deep; said to contain 10 ft. of water. The surroundings were bad; hogpens, privies and barnyards in close proximity to the well. The boy is thought to have eaten ice taken from Black River Ditch.

(8) Miss Davidson, aged 18, was taken sick about Aug. 15, with slow fever, which lasted six days; gastric disturbance and constipation. She is able to be about the house, but is still quite weak, and looks ill.

(9) Davidson boy, was sick with the same symptoms as those observed in his sister's case but he recovered before she did.

"The Davidson family have a well 40 ft. deep, but the water has been very low and too poor to use, so they have been using water from several wells in the neighborhood.

(10) Thos. Morton, a blacksmith, was taken sick on August 1, called Doctor Vincent on August 6. The doctor says he had a typical case of typhoid fever, to which he succumbed August 20. He was in the habit of drinking ice water at all the stores along the street, and water from wells wherever he happened to be.

"In company with Dr. J. G. Totten, health officer of Marion township, I made an inspection of nearly all the privies, hogpens, barnyards and outhouses in the village, and found nearly all of them in a neglected and very filthy condition. We also called on Dr. Totten's patients who gave me their case-histories as follows:

(11) Mrs. Allen has been sick with gastric disturbance—vomiting and pain in the stomach—she is much improved now. She has been troubled with ulceration of the stomach previous to this attack.

(12) Allen child (a), had measles a short time ago from which it has now recovered.

(13) Allen child (b), had some stomach and bowel trouble, with fever lasting about two days, is quite well now.

"This is a very poor, ignorant family; I could not learn much from them. Their premises are in a very filthy condition. On account of the illness of his wife, Doctor Totten had been unable to give them medical attention. They had used water from several wells in the neighborhood.

"The health officer—Dr. Totten, and others gave me information regarding cases of sickness and deaths which had occurred either in the village of Downington or believed to have originated there, as follows:

(14) Mrs. Totten had died of uterine trouble a few days previous to my visit in Downington.

(15 and 16) Mr. Southworth and Son, merchants in Downington, had closed their store and gone away for a summer vacation and to escape from the unhealthful conditions in Downington. The son went to Mayville, Tuscola county, and was reported to have died there of typical typhoid fever, in about two weeks after leaving home.

"The father went to Manistee, and is sick there now with typhoid fever. He has been sick for three weeks; he is very low and it is thought he can not recover.

"The Southworth home in Downington has been closed since they left town, and the well has not been used. It is a dug well with brick wall; the water was clear and without odor, and I was told that there was always a good stage of water in the well. I advised their having the water from this well analyzed. The well is in front of the house; back of the house and about 75 feet from the well was a foul privy, barns and outhouses.

"Cases of Sickness and one Death in the Vicinity of Downington.

"(1) Mrs. Gorrow, who lived on a farm one and one-half miles east of Downington, died August 19, of a disease which was probably typhoid fever.

"I could learn nothing of their water supply except that it was from a well on their farm. She visited the village of Downington frequently.

"In company with Dr. Vincent I drove out to the home of Joel Merriman who is health officer of Bridgehampton township, where we saw three cases of typhoid fever, presenting symptoms as follows:

"(2) Boy 5 years old, had fever—temperature was 101.5° in the axilla.

"He has been sick two weeks; is much emaciated, tongue coated, sordes on the teeth, diarrhea continues.

(3) Girl 16 years old, was sick three weeks ago, was better after a few days—able to be up and about—had a relapse some days ago and this afternoon (Aug. 23) she had a temperature of 104.2°, coated tongue and diarrhea.

(4) Boy 12 years old, has been sick one week. Was working on another farm but came home each Sunday. He is up and about the house, but his temperature is 103.8°, and he has diarrhea.

"There was no petechia apparent on any of these cases; there was some tympanitis and tenderness of the abdomen.

(5) The mother was taken sick with 'gastric fever' three weeks ago, she is well now. Their well water is from a dug well. The water appeared to be good; privy and barnyard were about 50 feet away from well; hogpen was 75 feet distant. These people have been cautioned by the doctor to boil all their drinking water.

(6) Robert Wright, aged 17, living on a farm two miles from Merriman's, had been sick for two weeks; was better the day before we saw him, able to be about the farm; he had eaten apples and tomatoes; when seen by us on the afternoon of August 26, he had a coated tongue, temperature of 99.5°, pain in the bowels, diarrhea and vomiting.

"Their well water seemed good, but had been low in the well all summer.

"These farms were near the Black River, and were surrounded by swamp land. We advised the families to use water for drinking purposes only after it had been boiled.

"Summary.

"The village of Downington is built on a number of little knolls; the soil is clay; the drainage of the town is supposed to be through little open ditches which empty into one main ditch. This main ditch runs down the principal street of the village and is open until it reaches the store buildings, where it is said to pass through a drain made of boards and logs. This drain is covered with earth and the people think it may be blocked up. The privies back of stores and dwellings are very foul; some have vaults (which are full) others have great accumulations on the surface of the ground. Barnyards and hogpens in the village have been neglected until the manure in some is a foot deep, and at night the stench is noticeable in any part of the village.

"They had a drought in that neighborhood, lasting until the early part of July, the water in the wells was very low, then the heavy rains began. In about two weeks after the first rain the sickness in the village commenced to increase. Privies, barnyards and hogpens were located on higher ground than the wells in many places. It is probable that the filth from the outhouses was washed into the wells by the heavy rains, and was the cause of the increased sickness.

"I advised the people to boil all drinking water; to clean up their premises, and see that the drainage of the town was adequate to carry off storm water. Printed documents, published by the State Board of Health, giving the best methods to be employed for the restriction and prevention of typhoid fever, were distributed where it was thought they would be of service to the people and aid them in getting a correct idea of the cause and nature of the disease.

"While in Downington I met all members of the township board of health whom I could, and discussed the situation with them. I advised them to call a meeting of the Board for the purpose of deciding on the best methods for abating the nuisances and securing a more healthful condition in the village."

SERUM-DIAGNOSIS OF TYPHOID FEVER.

At a meeting of the State Board of Health held October 5, 1896, Secretary Baker presented a circular just received from the Provincial Board of Health of Quebec which related to a rapid method for a serum-diagnosis of typhoid fever. The Quebec Board of Health has undertaken such a diagnosis which if as successful as it would now appear to be, will revolutionize that part of the practice of medicine, and will be extremely valuable in the restriction of typhoid fever. Its novelty is largely due to its simplicity. It seems Pfeiffer of Berlin and Widal of Paris have proved that the serum obtained from the fresh or even the dried blood of a typhoid fever patient is capable of so acting upon typhoid bacilli as to abolish the active motion so characteristic of those "germs" in fluid (bouillon) culture media, and to cause a gluing together of the individual bacilli into groups or clumps. This change is easily seen under the microscope, or in culture tubes, and occurs within a few minutes. For the purposes of testing the practical utility of the method, the Quebec Board offers to examine and report (free of charge) upon any samples of blood collected from suspected typhoid cases within its Province. This method is very simple: A piece of sterilized paper is sent out, the physician is to prick the ear or finger of his patient and collect on this paper a drop or two of blood, which is then sent to the bacteriological department of the Quebec Board, from which a report whether the case is typhoid will be sent within a few hours after receipt of sample. When the test gives a negative result, it is not certain that the patient is not suffering with typhoid, and the test should be repeated each day for several days. If the result continues negative, it is very strongly probable that the disease is not typhoid. But when the result of the test is positive it is certain that the patient has typhoid fever, and restrictive measures, and proper treatment can at once be commenced.

A copy of the above report was sent from this office to the leading newspapers, and to many health officers in localities in Michigan.

Typhoid Fever and Serum-Diagnosis in Kalamazoo City.

December 12, 1896, the board of health of the city of Kalamazoo issued a circular calling the attention of the medical profession to this serum-diagnosis of typhoid fever, giving the method used, and offering outfits for serum-diagnosis free of charge to Kalamazoo physicians. The circular stated that this outfit consisted of a folded piece of non-absorbable paper, with directions for its use and the following questions printed on the outside of the envelope: Sex, age, day of fever, severity of case, temperature for last 24 hours, probable clinical diagnosis, and the following symptoms *not* present to be marked—diarrhoea, abdominal tenderness, abdominal eruption, tympanites, enlargement of spleen, delirium. The date and name of the attending physician were to be given. The circular also stated that investigations at Kalamazoo agreed with the unanimous reports that the reaction is specific, occurring only in typhoid fever and only with the true typhoid bacillus. The one essential being a pure, fresh, active culture of the typhoid germ. The culture at the disposal of the Kalamazoo board having been presented to Dr. A. W. Crane,

M. D., Consulting Pathologist to the Department of Health, Kalamazoo, by Professor F. G. Novy, of the Michigan University. This culture gave the characteristic reaction in undoubted cases of typhoid fever.

Dr. A. H. Rockwell, health officer of Kalamazoo, wrote to this office, December 14, in regard to the local board of health not placing typhoid fever on the list of diseases to be placarded and quarantined, as follows:—

"Physicians and their patrons complain that the placard in typhoid fever frightens away friends and neighbors who would otherwise render desirable assistance. I have reason to believe that many cases have been treated as 'malarial fever,' 'bilious fever,' etc., which would have been reported as typhoid fever were it not for the annoyance, real or fancied, to which the placard subjects their patrons.

"During the present season death certificates have been presented in which malarial fever was assigned as the cause of death. Two death certificates gave 'bilious fever' as the cause of death."

December 15, Dr. Rockwell again wrote:—

"For the restriction of typhoid fever we follow the suggestions of the leaflet, sent out by the State Board for distribution, as nearly as possible except that we omit the placard for the reasons stated in my letter of the same date as the card sent you. The literature is distributed to the family and neighbors. The sanitary conditions of the premises are inspected and corrected as far as possible. The patient is isolated as far as possible. The sanitary and antiseptic suggestions of the leaflet are explained and those in charge are instructed to carry them into execution. The physicians have coöperated in this work as a rule. In the Kalamazoo Academy of Medicine the subject of typhoid fever has received considerable attention during the past summer and fall and I have taken every reasonable opportunity for impressing the necessity and desirability for friendly coöperation in the work of the restriction of typhoid fever and contagious disease in general, and at our September meeting I introduced a resolution to the effect that it is the sense of the Academy that all dwellings, shops and factories in the city which are located on the sewer and water mains should be connected with the same at the earliest possible date where practicable. I followed this resolution by sanitary inspection and recommendations to the city council for numerous sewer and water connections, which have been ordered by that body. Much has been accomplished along this line.

"I enclose you a circular which will give you an idea what we are doing along the line of early diagnosis in typhoid fever. It is believed that by taking the course we have, we will to a greater extent receive the coöperation of physicians and the public; that we will get a more complete report of cases and thus be able to do more along the line of educating the public."

Secretary Baker replied as follows:—

"Accept my cordial thanks for your letter of Dec. 15, giving full replies to my letter of Dec. 14. *

* * I hope you are right in your belief that you will be able to do more 'along the line of educating the public' by not placarding than by placarding where typhoid fever is present. But I believe the method of placarding is very valuable 'along the line of educating the public,' and I presume that after a time that method will be adopted in Kalamazoo.

"I have read your circular 'Serum-Diagnosis of Typhoid Fever'—with much interest. I should be glad to send a copy to each member of this Board. If practicable will you have the kindness to send me 10 or 15 copies."

Typhoid Fever at Lansing, Ingham County.

February 28, 1896, Dr. A. D. Hagadorn, health officer of the city of Lansing, reported a case of typhoid fever which was supposed to have come from Owosso, patient having worked there for a few weeks previous to being taken sick. In regard to restrictive measures used in this case, Dr. Hagadorn reported that, the discharges of the patient were disinfected by chloride of lime and buried, commencing to do this March 7, that

15 lbs. of sulphur were burned, (about one and one-half pounds per 1,000 cubic feet of air space) using the Acme fumigator. All clothing was either burned, washed and boiled, or fumigated. The patient was not entirely isolated, though but few people saw him.

May 30, typhoid fever was again reported. The source of contagium not traced. There were 60 cases and 6 deaths reported up to December 24, 1896. Dr. Hagadorn reported that an attempt was made to have measures of restriction enforced, but ignorance, filthiness, disobedience, unbelief, and many things made it impossible.

The first case of typhoid fever at the Industrial School occurred July 6, 1896, and was diagnosed malarial fever, as were some succeeding cases. During this outbreak, which ended January 5, 1897, in which there were 39 cases and 2 deaths, restrictive measures were carefully carried out—the patients being cared for in the school hospital.

Should a Public Funeral be held over a body dead from Typhoid Fever?

Dr. W. E. Bostwick, health officer of Algonac Vil., St. Clair Co., wrote to this office, September 19, 1896, as follows:—

“Do the health laws of this State allow the body of a person dead from typhoid fever to be taken into a church and a public funeral held?”

Sept. 22, 1896, Secretary Baker replied to the above question:—

“Replying to your letter of Sept. 19, there is no law which directly in specified terms prohibits a public funeral in a church where the body is dead from typhoid fever. Act 137, laws of 1883, makes it the duty of the health officer ‘To supervise funerals of persons dead from scarlet fever, diphtheria, small-pox, or other communicable disease which endangers the public health.’ It rests with you, as health officer, to say whether or not there shall be a public funeral. Typhoid fever is a ‘disease dangerous to the public health,’ and is now known to be sometimes spread by the contagion being carried through the air. No public funeral should be held in a house where there is or recently has been a case of typhoid fever; there would be less danger from a public funeral in a church, although I think it would be better not to hold a public funeral in a church. If such a funeral is to be held it is your duty to see that the public health is not endangered; you should see that the body is properly prepared and enclosed in an air-tight coffin or casket, and the body in no way exposed, except through glass.”

Inflammation of the Eye attributed to infection by Sputa of person dying of typhoid fever.

Dr. D. W. Roos, health officer of South Frankfort village, Benzie county, did not send in his final report of an outbreak of typhoid fever in his jurisdiction, which commenced in 1895 and ended in January, 1896, until the following June. A communication enclosed with this report was as follows:—

“Will state that my illness consisted of iritis, keratitis and conjunctivitis of the right eye, thought to have been induced by a dying typhoid fever patient coughing and spitting in the eye. Was such a case ever known?”

Secretary Baker replied that cases are on record of inflammation of the outer ear following typhoid fever, and due to the Eberth bacillus.

MEASURES TAKEN TO RESTRICT TYPHOID FEVER—RESULTS.

In studying the effects of efforts of health officers for the restriction and prevention of typhoid fever, and of the difficulties experienced by some of them in carrying out the methods recommended by the State Board of Health to that end, it is interesting to note the difference in the reported numbers of cases of sickness and of deaths, from this disease, in outbreaks where local health officers were enabled to enforce isolation and disinfection, and in those outbreaks in which, for any reason, those restrictive measures were neglected.

By Table 8 it may be seen that in the outbreaks relative to which the reports state that isolation and disinfection were enforced, there occurred 2.22 cases and .30 of one death per outbreak; whereas, in those outbreaks in which isolation and disinfection were neglected there were 6.80 cases and .79 of one death per outbreak, or over three times as many cases and more than twice as many deaths in outbreaks in which isolation and disinfection were neglected as there were in those outbreaks in which the restrictive measures were enforced.

An examination of Table 8 shows that there were 303 outbreaks where isolation and disinfection were doubtful, and that the number of cases and of deaths to the outbreak were less than in those outbreaks in which isolation and disinfection were neglected, and greater than in those where isolation and disinfection were enforced.

In the compilation of the reports for Tables 8 and 9 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

Table 9 indicates that in 1896 there was a saving of 2,041 cases and 168 lives through isolation and disinfection.

In the seven years, 1890-96, in those outbreaks in which isolation and disinfection were neglected the average number of cases per outbreak was 7.77, and the average number of deaths, .96 of one death; and in those outbreaks, in this period of years, in which restrictive measures were enforced, the average number of cases per outbreak was 2.43, and the average number of deaths per outbreak was .34 of one death. Diagram—Plate 929—graphically illustrates this difference.

TABLE 8.—Typhoid Fever in Michigan in 1896: Exhibiting the Numbers and Average Numbers of Cases and Deaths per Outbreak.*—
(1) in all the 629 outbreaks reported; (2) in the 303 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 13 outbreaks in which Disinfection was enforced and Isolation was doubtful; (4) in the 19 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 9 outbreaks in which Isolation was enforced and Disinfection was neglected; (6) in the 82 outbreaks in which Disinfection was enforced and Isolation was neglected; (7) in the 98 outbreaks in which both Isolation and Disinfection were neglected; (8) in the 105 outbreaks in which both Isolation and Disinfection were enforced.

(1) All outbreaks, (629 outbreaks †)	(2) Isolation or Disinfection or both not mentioned, or statements doubtful, (303 outbreaks.)		(3) Disinfection enforced—Isolation doubtful, (13 outbreaks.)		(4) Isolation enforced—Disinfection doubtful, (19 outbreaks.)		(5) Isolation enforced—Disinfection neglected, (9 outbreaks.)		(6) Disinfection enforced—Isolation neglected, (82 outbreaks.)		(7) Isolation and Disinfection both neglected, (98 outbreaks.)		(8) Isolation and Disinfection both enforced, (105 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals	2,236	329	1,026	179	56	9	20	3	209	27	666	77	253	32
Averages—	3.55	.52	3.39	.59	2.95	.47	2.22	.33	2.55	.33	6.80	.79	2.22	.30

* *Definition of Outbreak*.—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended, unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given, and the numbers given at the beginning of this article.

† These do not include the cases and deaths in Detroit, Grand Rapids and Wyandotte because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease was present in some part of the city nearly all the time.

Isolation and Disinfection Restrict Typhoid fever.

Typhoid fever in Michigan in the 7 years, 1890-96:- Exhibiting the average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both Neglected, and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)

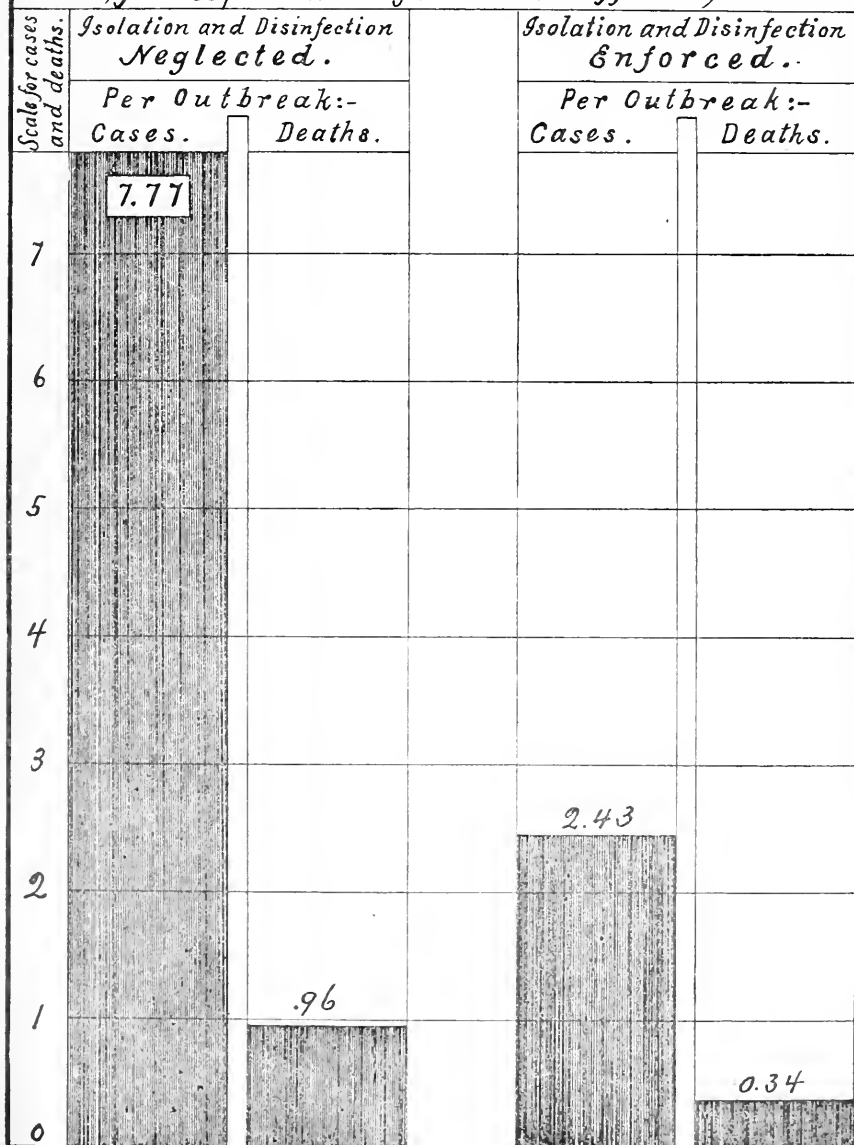


TABLE 9.—*Exhibiting for the seven years, and for each of the seven years 1890-96, the numbers of Reported Outbreaks, Cases and Deaths; also for this seven-year period, the average numbers of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation and Disinfection were both Neglected; Isolation and Disinfection both Enforced; and, also, the Numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

Years.	All Outbreaks.*				Isolation and Disinfection both Neglected.				Isolation and Disinfection both Enforced.				Cases and Deaths Indicated as having been Prevented by Isolation and Disinfection.	
	Out-breaks	Cases.	Deaths	Out-breaks.	Cases.	Deaths.	Out-breaks.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
1890	330	1,924	304	53	349	51	38	75	12	247	13			
1891	541	4,018	607	56	1,196	114	31	54	9	7,338	497			
1892	524	2,495	416	41	183	38	35	65	9	142	71			
1893	539	2,255	405	47	240	25	33	54	8	499	0			
1894	596	2,537	405	61	282	32	47	132	15	217	0			
1895	792	3,453	524	137	917	138	85	294	41	1,845	276			
1896	629	2,235	329	93	666	77	105	233	32	2,041	168			
Totals	3,951	18,618	2,990	493	3,833	475	374	907	126	12,524	1,025			
Averages, seven years	564	2,660	427	70	548	68	53	130	18	1,789	146			
Average cases and deaths per outbreak for seven years					†7.77	†.96		†2.43	†0.34					

* Outbreaks in Detroit, Grand Rapids and a few other localities, where the disease was present throughout the whole year, are not included, owing to the difficulty in determining the beginning and ending of an outbreak in those localities. The localities which are thus excluded in 1896 are given in a foot-note to Table 8 of this article; and for previous years, in foot-notes to similar tables in articles on typhoid fever for those years.

† These figures are graphically represented in the diagram, Plate 929.

AVERAGE DURATION OF TYPHOID FEVER.—FATAL AND NON-FATAL CASES.

TABLE 10.—*Exhibiting, by sex of patient, the average duration (in days) of fatal cases of sickness from Typhoid Fever in Michigan, during the ten years, and each of the ten years, 1887-96. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Typhoid Fever.														
Year.	Sex.	No. of cases included.	Duration of Sickness :—Per cent of Deaths in each Period of Days.											
			All cases.	Under 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1887.	Males.....	81	100	10	7	15	21	16	11	12	2	4	1	0
	Females.....	32	100	31	19	19	16	6	3	0	0	6	0	0
1888.	Males.....	40	100	20	13	18	23	10	8	0	5	3	3	0
	Females.....	33	100	24	21	15	12	9	6	3	0	0	9	0
1889.	Males.....	42	100	17	14	19	7	14	5	7	2	7	0	7
	Females.....	51	100	18	24	14	16	10	2	6	2	2	0	8
1890.	Males.....	57	100	19	9	21	23	5	5	7	0	4	2	5
	Females.....	26	100	19	23	8	8	19	12	0	8	0	0	4
1891.	Males.....	80	100	14	20	18	23	10	6	5	1	1	0	3
	Females.....	56	100	20	23	20	11	9	2	5	5	0	0	5
1892.	Males.....	92	100	23	21	14	13	14	4	3	3	-----	2	2
	Females.....	60	100	23	18	15	15	7	10	5	5	-----	2	-----
1893.	Males.....	94	100	24	15	11	13	11	4	5	3	4	4	5
	Females.....	84	100	25	30	7	13	7	7	6	7	1	0	1
1894.	Males.....	89	100	22	17	17	11	13	3	2	5	3	0	7
	Females.....	80	100	27	22	11	8	10	4	3	8	1	4	3
1895.	Males.....	150	100	19	17	15	17	7	9	4	3	3	2	4
	Females.....	107	100	24	22	15	8	7	7	7	4	3	1	2
1896.	Males.....	88	100	30	17	17	15	6	5	3	3	1	0	3
	Females.....	73	100	23	23	16	8	10	8	4	3	1	0	3
Av. 1887-1896.	Males.....	813	100	20	15	17	17	11	6	5	3	3	1	4
	Females.....	602	100	23	23	14	12	9	6	4	4	1	2	3

TABLE 11.—*Exhibiting, by Sex of patient, by per cent of cases which recovered in specified periods of time, the Average Duration (in days) of Non-Fatal cases of sickness from Typhoid Fever, in Michigan, during the ten years, and each of the ten years, 1887-96. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Typhoid Fever.														
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Cases in each Period of Days.											
			All Peri-ods.	Un-der 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1887.	Males.....	203	100	0	5	6	12	16	18	15	9	6	3	8
	Females.....	158	100	0	9	9	19	12	17	11	6	4	3	9
1888.	Males.....	164	100	1	4	13	9	13	15	9	10	9	9	7
	Females.....	111	100	0	2	7	14	15	15	19	4	8	10	8
1889.	Males.....	166	100	2	7	13	14	16	14	12	9	6	2	5
	Females....	165	100	6	8	9	14	19	12	11	8	2	2	7
1890.	Males.....	226	100	1	4	7	15	18	19	12	10	5	2	8
	Females.....	110	100	.....	4	14	16	17	13	14	9	2	5	6
1891.	Males.....	463	100	3	5	7	16	19	9	11	11	6	3	11
	Females.....	276	100	2	4	9	14	15	10	14	10	4	5	12
1892.	Males.....	329	100	2	4	5	16	22	12	12	11	5	2	9
	Females.....	177	100	2	5	8	15	14	14	9	8	8	4	14
1893.	Males.....	410	100	2	5	10	17	18	14	10	9	5	3	7
	Females.....	341	100	2	5	8	17	15	15	14	9	2	4	9
1894.	Males.....	453	100	2	6	7	14	15	16	13	7	6	3	10
	Females.....	340	100	2	5	9	14	18	17	11	7	5	4	8
1895.	Males.....	785	100	2	7	7	16	18	13	11	7	6	4	9
	Females.....	560	100	2	6	8	18	17	14	9	7	6	4	8
1896.	Males.....	500	100	1	6	10	15	18	12	11	8	5	3	11
	Females.....	382	100	2	6	11	14	19	14	12	8	3	3	9
Av. 1887-96.	Males.....	3,699	100	2	5	9	14	17	14	12	9	6	3	9
	Females.....	2,620	100	2	5	9	16	16	14	12	8	4	4	9

AGE OF OCCURRENCE OF TYPHOID FEVER.

 TABLE 12.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups sick from Typhoid Fever, in Michigan, during the ten years and each of the ten years, 1887-96; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of persons sick, Years.	No. of cases included.	Age.—In Periods of Years. Per cent of Cases in each Period of age.										
				All Ages.	Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1887.	Males.....	24	316	100	10	10	14	20	17	9	8	4	2	4
	Females.....	22	245	100	17	10	20	15	10	10	5	4	3	5
1888.	Males.....	24	310	100	12	13	15	20	11	11	5	4	3	6
	Females.....	23	199	100	12	22	20	14	8	5	4	6	3	7
1889.	Males.....	24	362	100	13	11	17	25	10	8	6	3	2	6
	Females.....	23	310	100	16	17	20	12	8	7	7	4	4	5
1890.	Males.....	22	325	100	14	12	16	25	16	7	4	3	2	3
	Females.....	20	199	100	16	16	24	17	11	6	5	1	2	4
1891.	Males.....	23	893	100	11	11	16	26	17	8	4	2	2	3
	Females.....	23	553	100	13	20	21	15	10	6	3	3	3	5
1892.	Males.....	23	*711	100	15	9	17	21	16	7	6	3	2	4
	Females.....	20	*506	100	22	16	22	13	8	6	4	4	2	2
1893.	Males.....	22	1,073	100	20	10	14	20	18	8	5	2	2	2
	Females.....	17	894	100	21	16	19	16	11	5	3	2	3	4
1894.	Males.....	23	813	100	21	12	13	17	13	7	9	3	2	3
	Females.....	22	649	100	22	15	18	11	11	7	5	3	3	4
1895.	Males.....	22	1,292	100	16	14	13	17	12	9	7	4	3	5
	Females.....	21	991	100	19	20	17	12	8	7	5	5	2	5
1896.	Males.....	22	835	100	17	15	14	17	10	9	7	3	3	4
	Females.....	22	666	100	16	17	19	14	11	7	5	4	2	5
Av. 1887-96.	Males.....	23	6,930	100	15	12	15	21	14	8	6	3	2	4
	Females.....	21	5,212	100	17	17	20	14	10	7	5	4	3	5

* In the Annual Report for 1893, the figures given for 1892, in Table 11 (Table 12 in this Report) include only the non-fatal cases of which the age and sex were given; whereas in the reports for 1894-96 all cases, both fatal and non-fatal, are included for 1892, as well as for all the other years treated.

TABLE 13.—*Exhibiting, by Sex, the Per Cent of persons in certain Age-groups who died of Typhoid Fever during each of the years 1892-96; also the per cent the deaths in each group were of all the deaths from Typhoid Fever.*

Year.	Sex.	Average age of decedents. Years.	No. of deaths included	Per Cent of Deaths in certain Age-groups.*										
				All Ages.	Under 10 years	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1892.	Males.....	28	116	100	3	6	18	22	22	8	4	5	3	8
	Females..	21	68	100	18	12	31	9	12	7	3	4	1	3
1893.	Males.....	28	121	100	7	5	11	24	23	13	7	2	2	5
	Females..	23	101	100	13	17	27	11	14	6	3	3	1	6
1894	Males.....	26	113	100	15	11	8	20	13	11	9	5	3	5
	Females..	27	97	100	11	9	22	9	14	8	6	7	0	14
1895	Males.....	28	176	100	9	8	14	16	12	11	7	6	5	12
	Females..	23	124	100	14	15	17	19	11	4	7	5	4	4
1896.	Males.....	26	132	100	7	11	18	21	10	10	11	3	3	7
	Females..	25	101	100	8	10	29	12	10	10	10	3	2	7
1892-96.	Per cent the deaths in each age-group were of all the deaths.....	-----	1,149	100	10	10	18	17	14	9	7	5	3	7

* In each age-group both years are included

According to the data in the office of the State Board of Health, Table 9 shows the number of cases and lives probably saved from typhoid fever during the seven years, 1890-96.

How the last four columns in Table 8 relative to 1896 differ from the experience in Michigan during the seven years 1890-96 may be seen by comparing the statements there made for 1896 with those in the diagram Plate No. 929, which graphically exhibits the data for the seven years, as tabulated in Table 9.

From Table 10 it may be seen that, of the 813 males and 602 females who were reported to have died from typhoid fever within the ten years, 1887-96, and of which the interval between the day of being taken sick and the day of death was given, 20 per cent of males and 23 per cent of females died before the tenth day of sickness; the same per cent (23) of females died after ten to fifteen days of sickness. 69 per cent of males and 72 per cent of females died before the twenty-fifth day of sickness.

The average duration of fatal cases of typhoid fever was 19.3 days for males and 20.2 days for females.

In Table 11 it may be noticed that in *non-fatal* cases of typhoid fever for the ten years, 1887-96, 61 per cent of the males and 62 per cent of

the females recovered before the thirty-fifth day of sickness. The average duration of non-fatal cases was about 33 days for both sexes.

The average duration of cases of typhoid fever in 1896, fatal and non-fatal, was 31 days for both males and females and for both sexes.

In studying Tables 12 and 13, and first four lines in Table 14, relative to age of persons who died with or who had typhoid fever, it should be held in mind that there are more persons living in the earlier ages than at the more advanced ages. In the last three lines of Table 14, and in the diagram "Age distribution," etc., Plate 787, this fact is taken account of, and the diagram graphically exhibits the relative danger of death at each period of life, according to the experience in Michigan in the two years 1892-3, and it is practically the same for the five years 1892-96, except in the age-periods from 25 to 30, and from 45 to 50, years where the average is lower, and from 35 to 40, where the average is much higher, as may be seen by the last line of Table 14.

By Table 14 it may be seen, that to males the greater danger of death from typhoid fever was in the age-periods 15 to 29 years, especially in the period 20 to 24 years; the greatest death-rate of females was during the age-period 15 to 19 years.

TWO LINES OF EVIDENCE OF THE PREVALENCE OF TYPHOID FEVER.

In studying the prevalence of typhoid fever in 1896, from the facts presented in the preceding and following pages, it must be borne in mind that those facts are derived from two distinct sources of information:

1.—The numbers of outbreaks, of cases of sickness, and of deaths from typhoid fever are taken from special reports from health officers and other township, city and village officers, during the course of an outbreak, at its close, or in annual reports at the close of the year. If all the people and officers reported as the law provides, the facts presented would represent the *actual numbers* of outbreaks, cases of sickness, and deaths from typhoid fever which occurred in the State during the year; but *all* do not so report. It is just, however, to state that as the people generally are becoming better instructed in the measures recommended by the State Board of Health for the saving of life and health, better and more complete reports are made year by year. So, each year, we believe that an increasing proportion of the cases of sickness and deaths from the dangerous communicable diseases are reported to this office. This tends toward an apparent increase in the prevalence of the disease each year, modified, of course, by the real fluctuation in prevalence. While waiting for perfect reports, the facts derived from those now received are valuable for purposes of study.

2.—The prevalence of typhoid fever, or any given disease, as indicated by the "per cent of reports" is taken from the weekly postal-card reports from regular correspondents of the State Board, health officers of cities and villages, and others. The "per cent of reports" is the per cent of the whole number of reports received which stated the presence of the disease named; it gives the relative prevalence of the disease, under the observation of the physicians who report. It may represent the relative area of prevalence of the disease, combined with the relative number of weeks the disease continued where it did occur, *but not the number of cases*.

TABLE 14.—*Exhibiting by sex, the number of persons in certain Age-groups who died of Typhoid Fever during each of the five years 1892-6; also by Age-groups, the average number of deaths in the five years, 1892-96, per 10,000 inhabitants.*

Year.	Sex.	Average age of decedents. Years.	No. of Deaths included.	Number of Deaths in certain Age-groups.*									
				Under 10 Years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 Years and over.
1892.	Males.....	28	116	4	7	21	26	25	9	5	6	4	9
	Females..	21	68	12	8	21	6	8	5	2	3	1	2
1893.	Males.....	28	121	8	6	13	29	28	16	9	3	3	6
	Females..	23	101	13	17	27	11	14	6	3	3	1	6
1894.	Males.....	26	113	17	12	9	23	15	12	10	6	3	6
	Females..	27	97	11	9	21	9	13	8	6	7	0	13
1895.	Males.....	28	176	16	14	25	28	21	19	13	11	8	21
	Females..	23	124	17	19	21	23	14	5	9	6	5	5
1896.	Males.....	26	132	9	14	24	28	13	13	14	4	4	9
	Females..	25	101	8	10	29	12	10	10	10	3	2	7
1892-96.	Males.....	{Deaths per 10,000 inhabitants, of the same sex, and age, in each age-group.}		.41	.91	1.66	2.53	2.11	1.56	1.25	.88	.76	.59
	Females..			.48	1.11	2.16	1.18	1.30	.85	.85	.76	.36	.44
1892-96.	The average number of deaths (both sexes) per 10,000 inhabitants in each age-group for the five years, 1892-96.....			.45	1.01	1.91	1.87	1.72	1.22	1.01	.83	.57	.52

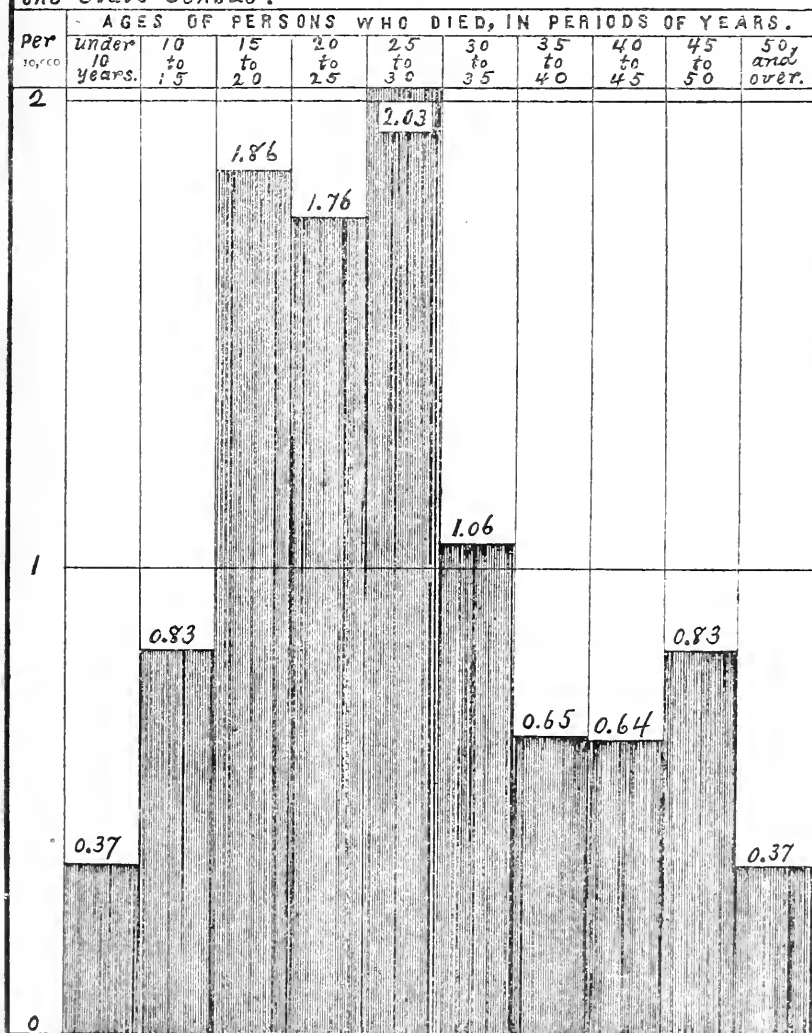
*In each age-group both years are included.

The weekly card-reports, however furnish a valuable means of ascertaining, approximately, the relative prevalence of the several diseases in a given year, and the relative prevalence of a given disease in one year compared with other years, and it is as good a scheme for ascertaining the facts as is yet available. Therefore the sickness statistics based upon those weekly card-reports should be relied upon for a comparison of the relative prevalence of typhoid fever in 1896, compared with preceding years. However, the evidence from the two sources may well be compared.

A comparison of the evidence from the two sources just mentioned, relative to typhoid fever during the years, 1885-1896, is facilitated by Table 15.

AGE-DISTRIBUTION OF DECEDENTS FROM TYPHOID FEVER .

Exhibiting by age groups the average proportionate numbers of deaths in Michigan in the 2 years 1892-93 per 10,000 persons living in June 1894, according to the State Census.



[PLATE 787.]

TABLE 15.—*By years for the twelve years 1885-96, and an average for the 10 years 1886-95, the per cent of reports (from regular correspondents to the State Board of Health, and others) stating the presence of Typhoid Fever in Michigan; also, for the same years and period of years, the number of outbreaks, number of localities of outbreaks, the cases of sickness and the deaths reported from Typhoid Fever.*

Years.	Per cent of weekly postal reports stating the presence of typhoid fever.	Reported outbreaks of typhoid fever.	Reported localities of outbreaks of typhoid fever.	Reported cases of sickness from typhoid fever.	Reported deaths from typhoid fever.
1885.....	8	218	200	715	194
1886.....	8	290	282	1,194	282
1887.....	10	335	320	2,424	411
1888.....	10	316	295	1,511	310
1889.....	10	432	398	2,530	402
1890.....	8	330	310	1,924	304
1891.....	11	543	501	4,670	697
1892.....	9	527	484	2,591	538
1893.....	9	545	504	3,512	594
1894.....	11	600	530	2,805	506
1895.....	13	800	695	3,751	621
1896.....	10	642	543	2,506	409
Average 10 Years, 1886-95	10	472	432	2,691	467

Typhoid Fever and Low Water in Wells.

Table 16 exhibits the relation of low water in wells to sickness (as shown by the weekly card-reports) and the reported deaths from typhoid fever in Michigan, for the eighteen years, 1878, 1880-96. The facts similar to those presented in two lines of this table, low water in wells and sickness from typhoid fever, for a ten-year period, are graphically represented in a diagram on page 256 of the Annual Report of this Board for 1889.

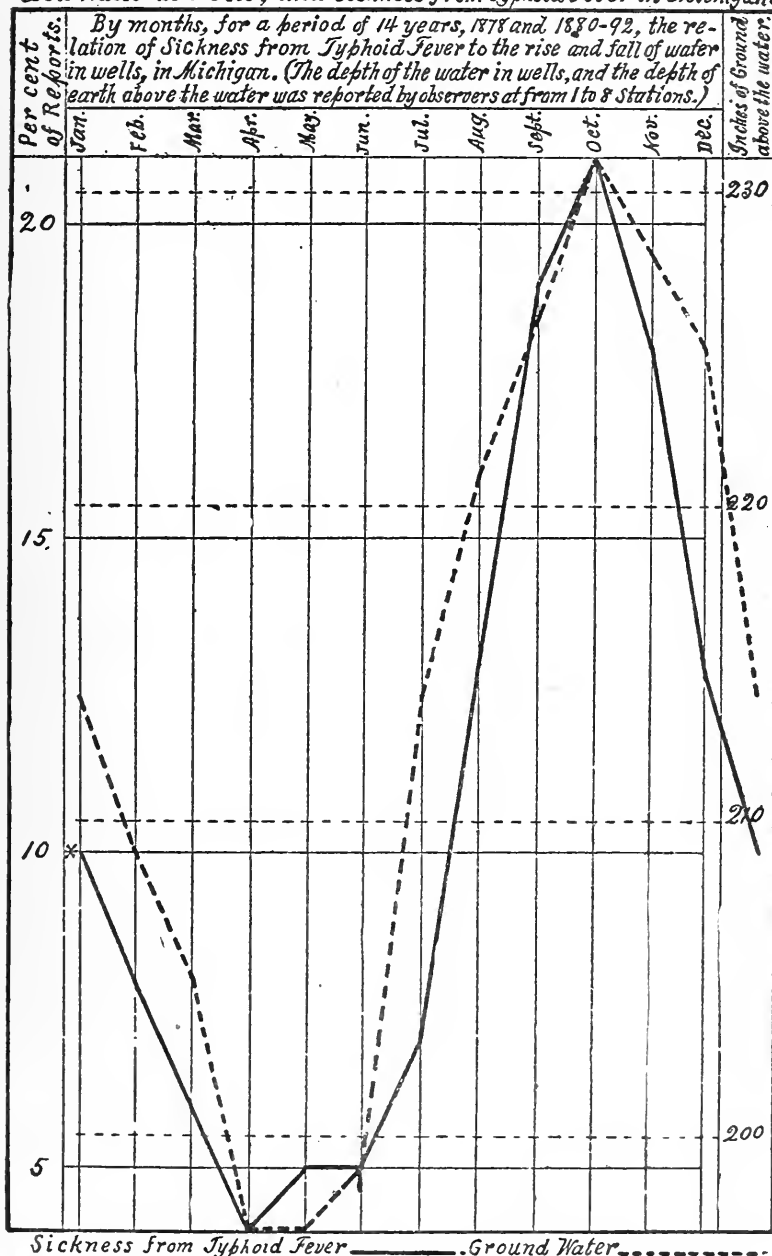
The diagram, Plate 681, on a subsequent page of this Report graphically represents the relation of the sickness from typhoid fever, according to the sickness statistics, to the rise and fall of the water in wells, in Michigan for the fourteen-year period comprising the years 1878 and 1880-92.

Table 19 exhibits the average prevalence of typhoid fever in Michigan by year and months for the ten years, 1878-87, and for each of the twelve years, 1885-96, as indicated by the weekly card-reports made by regular observers. Table 20 exhibits the rainfall by months and years for the period of ten years, 1878-87, and for each of the twelve years, 1885-96.

A study of this subject was made by the Secretary of this Board in a paper read before the American Public Health Association, at St. Louis, Mo., Oct. 16, 1884, which was printed in the Annual Report of this Board for the year 1884, pp. 89-114, and the study was continued subsequently, in the Annual Reports of this Board for the years 1888, pp. lv-lvii; 1889, pp. 254-262; 1890, pp. 247-251.

The evidence is conclusive that there is a necessary relation between the low water in wells and sickness from typhoid fever.

Low Water in Wells, and Sickness from Typhoid Fever in Michigan.



* Indicating what per cent of all reports received stated the presence of Typhoid Fever then under the observation of the physicians reporting. The danger from typhoid fever is greatest in October, when the water in wells is lowest, and least in April, when the water in wells is highest.

TABLE 16.—*Exhibiting, for Michigan, by Months, during the eighteen years, 1878, 1880-96,* the relation of low water in wells to sickness from Typhoid Fever; also, the reported number of deaths from Typhoid Fever.*

Conditions.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. inches of ground above the water in wells†	241	235	232	220	223	228	241	244	249	253	251	248
Fluctuation from Maximum Depth of water in wells‡	21	15	12	-----	3	8	21	24	29	33	31	28
Sickness from Typhoid Fever§	9	7	5	4	4	5	7	14	20	22	18	12
Av. number of reported deaths from Typhoid Fever||	26	23	26	27	25	24	29	59	93	106	77	54

* The data relating to the sickness and the deaths from typhoid fever in the years 1878, 1880-96, were used in order to coincide with the same period for which the measurements of ground above the water in wells were already obtained.

† The year 1879 could not be included as, for that year, there was no station from which reports were received for the whole year. The stations used in the compilation of this line, and the years for which reports were received and compiled from each are as follows: Elsie, 1878; Thornville, 1880-1 and 1885-7; Hillsdale, 1880, 1884, 1887-90, 1892-96; Mendon and Union City, 1880; Linden and Dearborn, 1881; Brockway Center, 1882 and 1883; Otisville and Woodland, 1882; Saginaw City, 1883; Kalamazoo, 1884, 1888 and 1889; Lansing, S. B. of H., 1885-96; Ann Arbor, 1886-95; Alpena, 1887-88; Otsego, 1887; Traverse City, 1888-93, 1895; Battle Creek, 1888, 1893-95; River Raisin, 1886-91, 1893-95.

‡ The Av. "Max. Depth" was in April, because the "Av. inches of earth above the water," was least in that month.

§ Percent of weekly reports, from observers in different parts of the State, which stated the presence of typhoid fever.

|| The data used in the compilation of this line were taken from the Registration Reports of Michigan.—Vital Statistics. No correction has been made for unequal lengths of months.

TABLE 17.—HEIGHT OF GROUND WATER.—*Inches of Earth above the Water—by Months for the twelve years, 1885-96, and for the last four months of the year 1884, and for each of the twelve years, 1885-96; also averages for the ten years, 1886-95, at Lansing, Mich.—Well in the Capitol Grounds.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1885-96.....	299	301	301	300	297	286	294	296	297	299	301	303	303
1884.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	290	291	293	292
1885.....	284	288	289	292	280	281	279	282	283	282	285	281	280
1886.....	281	276	278	274	272	273	277	282	287	287	286	291	294
1887.....	290	296	287	280	282	285	288	290	291	291	294	297	294
1888.....	294	292	298	294	293	293	293	293	290	293	297	294	300
1889.....	304	298	304	304	302	304	299	299	302	305	303	311	312
1890.....	300	309	307	305	302	295	292	293	295	300	300	298	300
1891.....	301	302	305	301	295	294	296	297	300	300	304	306	306
1892.....	301	308	307	306	305	300	295	293	293	296	300	304	305
1893.....	295	309	305	304	289	291	284	285	288	283	296	299	292
1894.....	298	294	293	296	296	294	287	292	296	300	305	313	312
1895*.....	322	316	319	320	319	322	324	324	324	324	324	324	324
1896†.....	319	324	324	321	321	321	319	320	319	317	316	313	313
Av. ten years, 1886-95	299	300	300	293	296	295	294	295	297	299	301	304	304

* In 1895, from June to December, the well at Lansing was dry, with the exception of the latter part of December, after the regular time for the observation was past.

† In 1896, during the months of January and February, the well at Lansing was dry.

TABLE 18.—*Exhibiting the number of Inches of Earth above the ground water in Lansing, by months, for each of the ten years 1887-96, compared with the per cent of reported cases and outbreaks of Typhoid Fever in Michigan, for each month; also the total numbers of cases and outbreaks reported for those years. (Compiled from those cases of which the date of occurrence was given; and for those outbreaks of which the time of beginning was stated.)*

Specifications relative to Ground Water and Typhoid Fever.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	No. of cases and outbreaks included in this table.
Inches of earth above the water, year 1887.	100	296	287	280	282	285	288	290	291	291	294	297	294	1,096
Per cent of cases of typhoid fever reported, year 1887.	100	2	1	1	1	2	3	8	20	24	19	12	7	289
Per cent of outbreaks which began in each month, 1887.	100	5	2	2	3	6	4	12	23	20	11	9	3	
Inches of earth above the water, year 1888.	100	292	298	294	293	293	293	293	290	293	297	294	300	609
Per cent of cases of typhoid fever reported, year 1888.	100	5	3	2	3	3	4	7	13	18	15	11	9	255
Per cent of outbreaks which began in each month, 1888.	100	7	5	3	3	4	6	12	15	16	15	6	7	
Inches of earth above the water, year 1889.	100	298	304	304	302	304	299	299	302	305	308	311	312	1,248
Per cent of cases of typhoid fever reported, year 1889.	100	1	2	1	2	1	2	4	12	28	24	15	7	382
Per cent of outbreaks which began in each month, 1889.	100	4	2	3	2	2	5	8	17	21	19	11	6	
Inches of earth above the water, year 1890.	100	309	307	305	302	296	292	293	295	300	300	298	300	1,089
Per cent of cases of typhoid fever reported, year 1890.	100	5	2	2	3	2	2	7	23	18	17	12	6	253
Per cent of outbreaks which began in each month, 1890.	100	5	4	3	3	6	5	9	25	13	15	6	5	
Inches of earth above the water, year 1891.	100	302	305	301	295	294	296	297	300	300	304	305	306	1,464
Per cent of cases of typhoid fever reported, year 1891.	100	6	2	1	2	2	2	5	14	24	23	13	6	454
Per cent of outbreaks which began in each month, 1891.	100	6	3	2	3	4	5	8	20	18	19	9	4	
Inches of earth above the water, year 1892.	100	308	307	306	305	300	295	293	293	296	300	304	305	2,482
Per cent of cases of typhoid fever reported, year 1892.	100	5	4	5	5	3	4	5	8	17	22	13	9	462
Per cent of outbreaks which began in each month, 1892.	100	10	3	3	3	4	5	8	16	16	15	7	9	
Inches of earth above the water, year 1893.	100	309	305	304	298	291	294	285	288	293	296	299	292	2,237
Per cent of cases of typhoid fever reported, year 1893.	100	2	2	3	2	3	13	8	15	18	20	10	6	469
Per cent of outbreaks which began in each month, 1893.	100	8	3	3	3	3	8	7	16	20	15	8	5	
Inches of earth above the water, year 1894.	100	294	293	296	296	294	297	292	296	300	305	313	312	2,805
Per cent of cases of typhoid fever reported, year 1894.	100	4	3	2	2	2	3	4	9	20	24	18	8	527
Per cent of outbreaks which began in each month, 1894.	100	7	3	2	2	4	6	8	19	17	17	9	4	
Inches of earth above the water, year 1895.	100	316	319	320	319	322	324	324	324	324	324	324	324	3,751
Per cent of cases of typhoid fever reported, year 1895.	100	3	3	2	2	2	3	3	12	22	33	26	14	716
Per cent of outbreaks which began in each month, 1895.	100	5	3	2	3	2	4	9	19	21	7	7	4	
Inches of earth above the water, year 1896.	100	324	324	321	321	321	319	320	319	317	316	313	313	3,417
Per cent of cases of typhoid fever reported, year 1896.	100	4	3	4	2	2	4	7	14	22	18	11	7	533
Per cent of outbreaks which began in each month, 1896.	100	8	4	3	5	4	8	13	18	18	10	5	4	

TABLE 19.—TYPHOID FEVER IN MICHIGAN.—*Average per cent of weekly card-reports stating the presence of Typhoid Fever, by year and Months, for ten years, 1878-87, and in each of the twelve years, 1885-96; also, the average for the ten years, 1886-95.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 yrs., 1878-87*.....	12	10	9	7	5	5	5	7	14	20	22	20	14
1885.....	† 8	11	7	5	4	3	5	5	6	11	13	16	8
1886.....	† 8	6	3	4	3	5	4	5	13	16	16	13	10
1887*.....	10	6	10	4	3	3	4	8	14	22	18	15	11
1888.....	10	10	7	6	5	4	5	7	12	18	16	12	10
1889.....	10	8	5	3	3	4	5	5	12	19	25	19	12
1890.....	8	6	1	2	2	2	5	6	15	15	16	13	7
1891.....	11	5	5	2	2	3	3	6	12	21	27	21	15
1892.....	9	7	5	4	4	3	4	5	13	16	17	11	12
1893.....	9	6	4	3	3	4	6	7	12	16	23	20	8
1894.....	11	7	5	4	2	6	5	7	15	23	24	17	13
1895.....	13	8	5	5	8	3	3	13	19	23	31	24	14
1896.....	10	10	10	3	3	3	6	9	16	24	17	11	4
Av. 10 yrs., 1886-95....	10	7	5	4	4	4	4	7	14	19	21	17	11

* For foot-note see bottom of next page.

TABLE 20.—RAINFALL IN MICHIGAN.—*Average number of Inches, by Months, for the ten years, 1878-87, and in each of the twelve years, 1885-96; also averages for the ten years, 1886-95.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. ten yrs., 1878-87..	37.27	2.09	2.89	2.28	2.49	3.52	4.24	3.44	3.21	3.72	3.45	2.98	2.69
1885.....	35.82	2.70	.73	.58	2.47	2.30	6.01	2.52	5.82	3.75	3.08	2.90	2.14
1886.....	32.16	3.05	1.72	2.74	2.40	2.58	2.29	1.36	4.21	5.36	1.97	2.35	2.13
1887.....	29.81	2.57	4.40	1.08	1.69	2.35	2.62	2.51	1.86	3.12	2.69	2.00	2.92
1888.....	29.57	1.99	1.77	2.51	2.15	3.73	2.87	2.02	2.38	2.66	2.68	2.92	1.89
1889.....	28.18	2.42	2.04	1.01	1.62	4.21	3.82	3.07	.98	1.85	1.10	3.10	2.96
1890.....	36.25	3.53	2.40	2.12	3.37	4.80	3.74	1.47	3.63	2.09	4.97	2.43	1.70
1891.....	31.66	1.91	3.13	2.74	2.03	1.33	2.53	2.55	4.41	1.92	1.71	4.86	2.54
1892.....	33.09	1.95	2.16	1.39	2.16	5.45	5.17	2.39	2.92	3.01	1.40	3.14	1.95
1893.....	36.35	2.34	2.78	2.40	4.77	2.91	3.55	2.83	1.22	2.52	4.24	3.05	3.74
1894.....	28.74	1.77	1.66	2.09	2.46	6.52	2.76	1.30	.72	3.13	2.76	2.02	1.55
1895.....	27.06	2.95	0.72	0.97	1.51	3.04	1.34	1.47	3.23	2.53	1.18	3.48	4.65
1896.....	32.65	1.61	1.34	1.29	2.91	3.14	3.13	4.25	3.95	4.92	1.80	3.38	0.92
Av. 10 years, 1886-95..	31.29	2.45	2.28	1.91	2.42	3.69	3.07	2.10	2.56	2.82	2.47	2.94	2.60

TABLE 21.—TEMPERATURE OF THE WATER *in the Well at the State Capitol in Lansing, Mich., by Months for the twelve years, 1885-96, and the last four months of the year 1884; also averages for the ten years, 1886-95.*

Year and period of years.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1884.....										50	51	51	49
1885.....	47	49	47	43	42	46	48	47	48	50	50	51	45
1886.....	48	49	47	46	45	46	46	47	50	52	52	51	50
1887.....	48	50	41	42	46	47	48	49	51	50	51	52	51
1888.....	49	50	49	48	47	48	48	47	50	51	51	52	51
1889.....	50	50	49	49	48	49	49	50	50	50	51	51	51
1890.....	50	50	49	49	48	49	49	49	50	51	51	52	51
1891.....	50	50	49	49	48	49	49	49	50	51	51	51	51
1892.....	50	50	50	49	49	49	50	49	50	51	53	52	52
1893.....	50	50	48	47	48	48	49	49	50	51	52	52	51
1894.....	51	51	50	49	49	49	49	50	50	52	52	53	52
1895.....	49	51	46	48	50	49							51
1896*.....	51			46	49	51	51	51	53	53	52	54	51
Av. 10 yrs., 1886-95†..	50	50	48	48	48	48	49	49	50	51	52	52	51

* In 1896, during January and February, the well at Lansing was dry, therefore the average temperature for that year is taken for the ten months when there was water in the well.

† The average temperature of the water in the well at Lansing for 1886-95 is necessarily incomplete for the reason that for the six months, June, July, August, September, October, and November, in 1895, there was no water in the well at Lansing, hence, no temperature; therefore the average temperature is taken for the ten years, 1886-95, for those months where the water was present in the well, and during those months when the well was dry, the average temperature for the nine years, 1886-94, is taken.

TABLE 22.—Sickness from Typhoid Fever in Michigan (as indicated by the weekly card-reports by all observers) and the depth of earth (in inches) above the water in the well, and the temperature of the water in the well at Lansing, Michigan, averages by Year and Months for the ten years, 1886-95.

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Sickness from Typhoid Fever*.....	10	7	5	4	4	4	4	7	14	19	21	17	11
Inches of earth above water in well†.....	299	300	300	298	296	295	294	295	297	299	301	304	304
Temperature of water in well‡.....	50	50	48	48	48	48	49	49	50	51	52	52	51

* Per cent of all reports received (from observers in different parts of the State) which stated the presence of typhoid fever, from last line in Table 19.

† This line is copied from the last line in Table 17.

‡ This line is copied from the last line in Table 21.

* The figures in the line for 1887, and in the line for the average for the ten years, 1878-87, in this table do not all exactly agree with those in the same lines in the table printed on page lvi, of the report of this Board for the year 1888, for the reason that the table printed in the Report for 1888 was made before the cards were all compiled for the year, and was taken from the compilation (of the card reports first received) for the quarterly reports. The line "Average 10 years 1878-87," included the data for the year 1887 and consequently is not exactly, although it is substantially, the same as in the above table.

† Since May, 1885, physicians have reported only the prevalence of diseases under their own observation. Previous to that time diseases which were believed to be present (under the care of other physicians) were so reported. This undoubtedly accounts for a part of the sudden decrease in 1885 and 1886 as compared with the preceding years.

TABLE 23.—*Exhibiting the Average Total Annual Rainfall at Stations in Michigan, the same for Lansing, the inches of earth above the ground water at Lansing, the inches of water in an undisturbed well at Lansing, and the reported sickness, from Typhoid Fever in Michigan, as indicated by the per cent of all the weekly card-reports which stated the presence of Typhoid Fever, during each of the 12 years, 1885-96, and averages for the 10 years, 1886-95.*

Year, and period of years.	Average total Annual Rainfall at Stations in Michigan, in inches.	Total Annual Rainfall at Lansing, in inches.	Inches of earth above the Ground Water at Lansing.	Inches of water in an unused well at Lansing.	Ground Water higher (+) or lower (-) than the 10 years' Average, in inches.	Average Per Cent of all weekly card- reports stating the presence of Typhoid Fever.	More (+) or less (-) Sickness from Typhoid Fever than the ten years' Average.
1885.....	35.82	34.51	284	40	+14	8	-2
1886.....	32.16	29.52	281	43	+17	8	-2
1887.....	29.82	30.08	290	34	+8	10	0
1888.....	29.55	25.76	294	30	+4	10	0
1889.....	28.18	23.28	304	20	-6	10	0
1890.....	30.20	33.96	300	24	-2	8	-2
1891.....	31.66	29.05	301	24	-2	11	+1
1892.....	33.08	31.97	301	23	-3	9	-1
1893.....	36.34	39.52	295	29	+3	9	-1
1894.....	28.74	24.96	298	26	0	11	+1
1895.....	27.06	27.52	322	5	-21	13	+3
1896.....	32.65	32.78	319	5	-21	12	+2
Av. 10 yrs., 1886-95..	30.68	29.56	299	26	-----	10	-----

WHOOPIING-COUGH IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1896.

During the year ending December 31, 1896, there were reported to the Secretary of the State Board of Health, 297 outbreaks of whooping-cough in 281 localities in Michigan, which resulted in 5,466 cases and 91 deaths, with an average of 19.5 cases and .32 of one death per locality. The death-rate from this disease for the State in 1896, according to reports to this Office, was .39 of one death per 10,000 inhabitants.

TABLE 1.—*Whooping-cough in Michigan for the ten years, 1887-96. Exhibiting the numbers of reported cases and deaths and the number of localities in which the presence of the disease was reported, together with the cases and deaths per locality and per 100,000 inhabitants, and the per cent the deaths were of cases. (Compiled from reports received at the Office of the Secretary of the State Board of Health.)*

Years.	Cases.	Deaths.	Localities.	Cases per Locality.	Deaths per Locality.	Cases per 100,000 Inhabitants.	Deaths per 100,000 Inhabitants.	Per cent deaths were of Cases.
1887.....	2,267	59	162	16.	.36	115	3.	3.
1888.....	2,502	49	161	15.5	.3	124	2.4	2.
1889.....	2,694	41	139	19.	.3	131	2.	2.
1890.....	983	20	93	10.6	.2	47	1.	2.
1891.....	2,360	101	162	14.6	.6	111	5.	4.
1892.....	3,188	77	191	16.7	.4	147	3.5	2.
1893.....	4,047	134	214	18.9	.63	184	6.	3.
1894.....	4,555	123	241	18.9	.51	203	5.5	3.
1895.....	4,284	*109	240	17.9	.45	188	4.8	3.
1896.....	5,466	*91	281	19.5	.32	236	3.9	2.
Totals, 1887-96	32,346	804	1,884	-----	-----	-----	-----	-----
Av. for 10 years..	3,235	82	188	16.8	.41	149	3.7	3.

* In numerous instances only the fatal cases were reported to this Office.

Whooping-cough in 1896, Compared with Previous Years.

It is gratifying to notice that cases of whooping-cough are being reported to the health authorities more carefully each year. The State Board of Health has been earnest in its efforts to have this disease given due attention by the people and health officials. Judging from the vital statistics of Michigan, which show a total number of 4,043 deaths from measles and 4,102 deaths from whooping-cough, during the 28 years,

1869-96, these two diseases are of about equal importance. During the past three years the number of deaths returned, to the Secretary of State, as due to scarlet fever is 385, while 456 were returned as due to whooping-cough.

While the death-rates from measles, scarlet fever, diphtheria, etc., have decreased very considerably, the annual death-rate from whooping-cough in Michigan has not shown such a favorable decrease. When the same amount of care is taken in the isolation of cases of whooping-cough, and disinfection of premises infected with that disease, as is observed in the other diseases mentioned above, there will probably be a marked decrease in the death-rate from whooping-cough.

Table 1 shows that the numbers of cases and deaths from whooping-cough reported to the Secretary of the State Board of Health, during the ten years, 1887-96, have slowly increased from year to year, the per cent of deaths to cases have remained about the same, the death-rate has varied slightly, but without any uniformity, the number of reported cases to 100,000 population has increased directly with the increased number of cases reported. It is probable that there are still very many cases and deaths from whooping-cough in Michigan, which are not yet reported to this Office. During the year 1896 there were 158 deaths from whooping-cough reported to the Secretary of State, while there were only 91 deaths from the same disease reported to this Office.

TABLE 2.—*Exhibiting the reported number of deaths from whooping-cough per 100,000 persons living in Michigan in each of the 28 years, 1869-96. (Compiled from the Secretary of State's Vital Statistics of Michigan. Population estimated by average annual increase.)*

Year.	1869	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879	1880.	1881.	1882.
Deaths (per 100,000, etc.)..	13.9	10.1	5.5	15.1	15.6	11.2	7.2	12.4	8.7	8.5	10.2	16.1	8.4	5.0
Year.	1883.	1884	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths (per 100,000, etc.)..	5.2	8.8	7.4	9.7	5.6	8.7	6.8	3.6	7.4	6.7	7.8	7.0	6.1	6.8

According to the Reports Made to the Secretary of State.

Table 2, showing the number of deaths from whooping-cough per 100,000 persons living, reported to the Secretary of State, probably quite accurately represents the annual fluctuations of, but not the total death-rate from whooping-cough in Michigan during the 28 years, 1869-96. Probably the omissions are about the same in every year, therefore these statistics of the State Department are useful for comparing one year with another.

TABLE 3.—*Exhibiting the Population of Michigan for the year 1896, by tiers of counties (Upper Peninsula as one tier); also the numbers of cases of, and deaths from Whooping-cough REPORTED from each of the divisions for 1896, and the number of cases per 10,000 population of each division.*

Counties Grouped by tiers, most Northern Counties First.			Estimated population, 1896,*	Reported Cases of Whooping- Cough, 1896.	Reported Cases per 10,000 of Population.	Reported Deaths from Whooping- Cough, 1896.	Reported Deaths per 10,000 of Population.
State-----			2,315,517	5,466	23.61	91	.39
Upper Penin- sula-----	{ Keweenaw. Ontonagon. Houghton. Baraga. Marquette. Alger. Schoolcraft. Luce.	{ Chippewa. Gogebic. Iron. Dickinson. Menominee. Delta. Mackinac.	219,561	876	39.89	12	.55
Eleventh tier of counties..	{ Emmet. Charlevoix. Leelanaw.	{ Cheboygan. Presque Isle.	44,907	129	28.72	4	.89
Tenth tier of counties....	{ Antrim. Otsego. Montmorency.	{ Alpena.	50,469	124	24.57	2	.40
Ninth tier of counties....	{ Benzie. G'd.Traverse. Kalkaska. Manistee.	{ Crawford. Oscoda. Alcona.	44,715	680	154.31	2	.45
Eighth tier of counties....	{ Wexford. Missaukee. Roscommon.	{ Ogemaw. Iosco.	68,430	251	36.68	9	1.32
Seventh tier of counties..	{ Mason. Lake. Osceola. Clare.	{ Gladwin. Bay. Huron. Arenac.	161,297	276	17.11	3	.19
Sixth tier of counties....	{ Oceana. Newaygo. Mecosta. Isabella.	{ Midland.	94,010	311	33.08	3	.32
Fifth tier of counties....	{ Muskegon. Montcalm. Gratiot. Saginaw.	{ Tuscola. Sanilac.	251,370	450	17.90	6	.24
Fourth tier of counties....	{ Ottawa. Kent. Ionia. Clinton.	{ Shiawassee. Genesee. Lapeer. St. Clair.	389,922	776	19.90	19	.49
Third tier of counties....	{ Allegan. Barry. Eaton. Ingham.	{ Livingston. Oakland. Macomb.	232,834	717	30.79	6	.26
Second tier of counties....	{ Van Buren. Kalamazoo. Calhoun. Jackson. Berrien.	{ Washtenaw. Wayne.	525,805	214	4.07	24	.46
First tier of counties....	{ Cass. St. Joseph. Branch.	{ Hillsdale. Lenawee. Monroe.	232,233	652	28.08	1	.04

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the Office of the State Board of Health.

Distribution of Whooping-cough by Divisions of the State during 1896.

Table 3 exhibits the distribution of whooping-cough by divisions of the State, according to the reports made to the Secretary of the State Board of Health, during the year 1896. The table shows the reported numbers of cases and deaths, also the sickness and death-rates from whooping-cough, for each division.

Sickness-rates from Whooping-cough.

By this table (3), it appears that the lowest sickness-rate (4.07 cases per 10,000 of population) was in the second tier of counties. This tier has the largest reported number of deaths and it is probable that it should have the largest reported number of cases and that its sickness-rate should have been much higher than is shown in this table but only a small proportion of the cases which actually occurred were reported to this Office.

The highest sickness-rate (154.31 cases per 10,000 population) was in the ninth tier of counties.

Death-rates from Whooping-cough.

Table 3 shows the lowest death-rate (.04 of one death per 10,000 of population) to have been in the first tier of counties. The mortality in this tier (.15) was much below the average mortality-rate (1.67) for the State.

The highest death-rate (1.32 deaths per 10,000 population) was in the eighth tier of counties.

Whooping-cough in Each Month of the Year, 1896.

TABLE 4.—*Exhibiting the reported number of outbreaks of Whooping-cough which were Present, in each Month of the Year 1896, in the different local jurisdictions of Michigan.*

Months.....	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Outbreaks present.....	42	47	45	51	58	59	63	55	63	51	53	52

From the above table (4) it appears that the prevalence of whooping-cough is quite uniform throughout the year. A study of Exhibit XX, page 139 of this Report, shows that whooping-cough, according to the weekly card-reports made to this office, during the 19 years, 1877-95, varied but little in the different months; the *lowest* monthly average of reports which stated the presence of whooping-cough was 14 per cent of all reports received, while the *highest* monthly average was only 18 per cent.

Source of Contagium of Whooping-cough and How the Disease is Spread.

Of the 5,466 cases of whooping-cough reported, during the year 1896, as exhibited in the following table, the local health officers reported the source of contagium as follows:—Traced to a former case, 1,170; from outside jurisdiction, 49; probably from outside jurisdiction, 4; contracted in school, 11; unknown, 2,579; not reported or indefinitely reported, 1,653; total, 5,466.

TABLE 5.—*Reported Source of Contagium of Cases of Whooping-cough, in 1896.*

Traced to a former case.....	1,170
Contagium reported as from outside jurisdiction.....	49
Contagium reported as probably from outside jurisdiction.....	4
Contracted in school.....	11
Unknown or reports not definite (includes those reported "Contagium," "Sporadic," "Spontaneous," "De Novo," etc.).....	2,579
Not reported.....	1,653
All cases.....	5,466

Cases Traced to a Preceding Case.

Table 5, shows that of the 5,466 reported cases of whooping-cough in the State in 1896, 1,170 were reported as traced to preceding cases of the disease. The following extracts give the substance of a few of these reports:—

C. S. Sackett, M. D., health officer of Brookfield township, Eaton county, reported the source of contagium as "By direct exposure." There were 25 cases and 2 deaths in this outbreak.

C. D. Parsons, M. D., health officer of Burr Oak village, St. Joseph county, stated that the source of contagium was from a "Child visiting in town who had not fully recovered." There were only 3 cases in this outbreak, and the period of incubation was given as about one week.

Contagium from Outside of Jurisdiction.

Local health officers in giving the source of contagium of outbreaks of whooping-cough in their jurisdictions often state definitely that it was from some place outside of their jurisdiction. As an instance of this kind, E. E. Lamb, M. D., health officer, of Republic township, Marquette county, stated that the contagium was brought into his jurisdiction from Champion township. There were 300 cases and 3 deaths in this outbreak. All the cases could be traced to former cases, and the health officer stated the period of incubation as from 5 to 15 days.

G. W. Chrouch, M. D., health officer of Woodhull township, Shiawassee county, wrote relative to the source of contagium of an outbreak in his jurisdiction: "From child whose parents were visiting from the township of Williamston, Ingham county."

An outbreak of whooping-cough occurred in Torch Lake township, Antrim county, in which there were 40 cases with 2 deaths. The health officer, Peter C. Bargy, gave the source of contagium as "parties visiting in our township from Central Lake."

Samuel Doggett, health officer of Grant township, Clare county, reported the source of contagium of an outbreak of whooping-cough in his jurisdiction as "Taken from other children who had moved from Cass county." There were 7 cases and 1 death in this outbreak and all cases could be traced to a previous case.

Whooping-cough Contracted in School.

"Contracted in school," is often given as the source of contagium. When a child is taken sick with whooping-cough in school, all the other children in the room are exposed. The onset of the disease is probably the time when the contagium is most readily communicated to others. Below are given a few extracts from the reports of health officers where the first cases occurred in school or at some public gathering:—

E. C. Palmer, M. D., health officer of the city of Charlotte, reported the source of contagium of an outbreak in his jurisdiction as "Broke out in the school." There were 40 cases in this outbreak.

E. E. Sayles, M. D., health officer of Baldwin village, Lake county, gave "The school room" as the source of contagium of an outbreak which occurred in his jurisdiction.

D. H. Cole, M. D., health officer of Memphis village, Macomb county, stated that contagium of whooping-cough was introduced into his jurisdiction "By a scholar with the disease entering the school." There were 150 cases in this outbreak, and all could be traced to former cases.

R. F. Blaisdell, M. D., health officer of Sheridan village, Montcalm county, reported as the source of an outbreak "Came down in village school." There were 14 cases in the outbreak, 13 of which could be traced to former cases.

C. L. Tuomey, health officer of Ann Arbor township, gave the source of contagium as "Taken at school in the city of Ann Arbor."

L. D. Lincoln, health officer of Hamilton township, Gratiot county, reported the source of an outbreak which occurred in his jurisdiction, as "From a social in another township." There were 15 cases in this outbreak; the period of incubation was from 9 to 12 days in 14 of these cases.

Whooping-cough Brought into Michigan by Immigrants.

It is believed by the Secretary of this Board that many outbreaks of the communicable diseases in Michigan originate from immigrants who carry the infection on their persons or in their baggage. In support of this belief, Geo. D. Beech, M. D., health officer of Champion township, Marquette county, wrote relative to an outbreak of whooping-cough in his jurisdiction as follows: "I found a colony of whooping-cough in a Finlander location this week. It was brought in by a family of immigrants and spread very rapidly. In order to report these cases I would need a private secretary and an interpreter, for which reason I beg you to excuse me from making a weekly report of whooping-cough. Quarantine or isolation is impossible."

Whooping-cough Contracted While Travelling.

The contagious diseases are probably often contracted while travelling. If a person is taken sick with one of these diseases while on the train the car becomes infected but as the patient leaves the train before the nature of the disease is known no attempt is made to disinfect the car. Another person coming into the car, probably occupying the seat just vacated by the person sick with whooping-cough or some other contagious disease,

will become infected and carry the disease to his home, thus being the first case in a new outbreak. Probably the only remedy for this would be a law requiring railroad companies to fumigate their coaches and sleeping cars. This disinfection can now be done by means of Formaldehyde vapor without damage to the car and at small expense to the company. It would seem that railroad companies so disinfecting their sleepers and coaches would have increased patronage, by people who know the dangers of ordinary travel.

How Whooping-cough is Spread.—Transgressions of Public-health Laws.

Physicians, health officers and the people are criminally careless about restricting and reporting cases of whooping-cough. This carelessness is probably due to their ignorance of the importance of this disease. They may not know that whooping-cough has caused more deaths in Michigan during the past three years than either scarlet fever or measles.*

The following extracts from correspondence with health officers show how transgressions of public-health laws resulted in the spread of whooping-cough:—

Dr. Chas. G. Jenkins, health officer of the city of Mason, in writing to the Secretary of this Board relative to an outbreak of whooping-cough in his jurisdiction said:—"Whooping-cough has been epidemic here for about six or eight months, and no one has attempted to quarantine it, in fact *many* of the cases have not had any doctor's care at all, so that though there are still a few cases it is practically over with and I have heard of but one death; which was early in the year and before my appointment as city health officer."

Paul J. Darling, health officer of Tompkins township, Jackson county, reported relative to an outbreak of whooping-cough in his jurisdiction as follows:—"There were several cases of whooping-cough in the township but none were reported to me, and none of the cases were fatal.

Estimated Number of Outbreaks and Cases of Whooping-cough Prevented and Lives Saved by Isolation and Disinfection.

Comparisons are made in Table 6, of the average numbers of cases and deaths in outbreaks of whooping-cough where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in outbreaks where these measures were neglected.†

* According to the returns made to the Secretary of State.

† In the compilation of the reports for Table 6 showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper column. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

TABLE 6.—Whooping-cough in Michigan in 1896: Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—
 (1) in all the 290 outbreaks reported; (2) in the 181 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 1 outbreak in which Disinfection was enforced and Isolation doubtful; (4) in the 4 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 2 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 4 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 93 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 5 outbreaks in which Isolation and Disinfection were both enforced.

	(1) All outbreaks, (290 outbreaks.)		(2) Isolation or Disinfection or both not mentioned, or statements doubtful, (181 outbreaks.)		(3) Disinfection enforced—Isolation doubtful, (1 outbreak.)		(4) Isolation enforced—Disinfection doubtful, (4 outbreaks.)		(5) Disinfection enforced—Isolation neglected, (2 outbreaks.)		(6) Isolation enforced—Disinfection neglected, (4 outbreaks.)		(7) Isolation and Disinfection both neglected, (93 outbreaks.)		(8) Isolation and Disinfection both enforced, (5 outbreaks.)	
	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,	Cases,	Deaths,
Totals.....	5,534	79	2,721	54	2	0	7	0	6	0	29	1	2,753	23	16	1
Averages..	19.08	.27	15.03	.30	2	0	1.75	0	3.00	0	7.25	.25	29.60	.25	3.20	.20

By this table (6) it may be seen that during the year 1896 there were reported to the Office of the State Board of Health, 290* outbreaks of whooping-cough, with 5,534 cases and 79 deaths. Had no efforts at restriction been made, and had the average number of cases per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 8,584 cases. Had the average numbers of cases and deaths in all outbreaks been the same as those in the column headed "Isolation and Disinfection both enforced," there would have occurred only 928 cases and 58 deaths, or 4,606 cases of sickness and 21 deaths from whooping-cough would have been prevented.

Period of Incubation, in Whooping-cough.

TABLE 7.—*Exhibiting the reported period of Incubation, stated in days, in 23 instances of Whooping-cough. Compiled from reports of Health Officers in Michigan, for the year 1896.*

Incubation period—days.....	7	8	9	10	12	14	21	25
Instances in each period.....	*3	1	†3	‡3	1	§7	¶3	2

* In 2 of these instances it was reported as about 7 days.

† In 1 of these instances it was reported as about 9 days.

‡ In 2 of these instances it was reported as about 10 days.

§ In 3 of these instances it was reported as about 14 days.

¶ In 2 of these instances it was reported as about 21 days.

|| In 1 of these instances it was reported as about 1 day.

The average period of incubation in the 23 reported instances is 13.7 days; the greatest number of instances given in any single period was in the 14-day period.

TABLE 8.—*Exhibiting, relative to 34 instances of Whooping-cough in Michigan in 1896, the Reported Period of Incubation, within certain limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.
5 to 12	8.5	7 to 14	10.5	9 to 20	14.5	9 to 20	14.5	9 to 23	16.0
5 to 14	9.5	8 to 10	9.0	9 to 20	14.5	9 to 20	14.5	9 to 24	16.5
5 to 15	10.0	8 to 12	10.0	9 to 20	14.5	9 to 20	14.5	10 to 14	12.0
7 to 10	8.5	9 to 12	10.5	9 to 20	14.5	9 to 20	14.5	10 to 14	12.0
7 to 10	8.5	9 to 14	14.5	9 to 20	14.5	9 to 20	14.5	21 to 30	35.5
7 to 12	9.5	9 to 20	14.5	9 to 20	14.5	9 to 20	14.5		
7 to 12	9.5	9 to 20	14.5	9 to 20	14.5	9 to 20	14.5		
		9 to 20	14.5						

* Whenever a break of 60 days or more has occurred in the progress of a communicable disease in a given township, village or city it has hitherto been regarded as two different outbreaks, but in estimating outbreaks for this Table 6 and the corresponding tables for other diseases, if the second appearance of the disease originated from the first the intermission was disregarded and it was treated as a single outbreak. Also, comparisons of years require that outbreaks be counted as closed at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even when they extend from one year into the next. This explains the apparent discrepancy between the number of outbreaks here given and the number given at the beginning of this article.

The average of all the means, for the 34 instances, is 13.9 days.

*Ages of Greatest Prevalence of, and Mortality from Whooping-cough.**

In Table 9 are shown the numbers of cases and deaths from whooping-cough in Michigan in 1896, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in special groups were of all deaths.

TABLE 9.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Whooping-cough, the per cent that the cases in each group were of All Cases of Known ages; the per cent that the Deaths in each group were of All Deaths at Known ages; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1896 which stated the ages.*

Ages in groups of Years	Number and per cent of Cases and Deaths in certain Age-groups.†																
	All Known Ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50 and over.
No. of cases	±777	67	65	62	81	70	345	308	85	24	5	2	3	2	1	0	2
Per cent the cases in each group were of all cases of Known ages.	100	8.6	8.4	8.0	10.4	9.0	44.4	39.6	10.9	3.1	.6	.3	.3	.3	.1	.0	.3
No. of deaths.....	±28	16	4	1	3	0	24	4	0	0	0	0	0	0	0	0	0
Per cent the deaths in each group were of all cases in that group.....	3.6	23.9	6.2	1.6	3.7	0	7.0	1.3	0	0	0	0	0	0	0	0	0
Per cent the deaths in each group were of all deaths, Known ages..	100	57.1	14.3	3.6	10.7	0	85.7	14.3	0	0	0	0	0	0	0	0	0
Per cent the deaths in special groups were of all deaths Known ages.....		85.7					100					0					

* In compiling data relative to ages, used in tables in this article each age-period begins and ends on the birthday. For arranging the ages by single years or in age-periods the following method is pursued:—From birth to one year old is the *first* year. Those one year old and less than two years old are classed in the second year. The third year of age includes all persons over two years and less than three years of age, and so on for each succeeding year.

In dividing the ages into five-year periods, the first period includes all ages from birth to five years, or all *under* five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.

† Method of grouping is stated in the text preceding this table.

‡ Does not include those cases or deaths where the age was not stated.

TABLE 10.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Whooping-cough, in Michigan, during the year 1896; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of persons who recovered. Years.	No. of cases included.	Age.—In Periods of Years. Per cent of (non-fatal) Cases in each Period.*													
				All Ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.
1896.	Males.....	5.9	359	100	42.9	41.5	10.9	3.6	.8	0	0	.3	0	0	0	0	0
	Females..	6.3	390	100	42.8	39.7	11.8	2.8	.5	.5	.8	.3	.3	0	0	.3	.3

* On a preceding page, a foot-note to the sub-head under which this table appears, explains these age-groups.

The data shown in Tables 10 and 11, although limited to those fatal and non-fatal cases of whooping-cough where the sex and ages were stated in the reports for the year 1896, yet the information agrees quite nearly with statistics collected in this and other countries. Females are generally supposed to be more liable to this disease than males. Of the 749 non-fatal cases, where sex and ages were stated, 52.1 per cent were females and 47.9 per cent males. Of the 28 deaths (Table 11) 53.6 per cent were females and 46.4 per cent were males. There were not only a greater number of cases and deaths from whooping-cough among females, but the sickness-rates and death-rates were greater for females than for males, since for the year 1896 the estimated number of females living in Michigan was less than the estimated number of males in each corresponding age-period.

TABLE 11.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who Died of Whooping-cough during the year 1896.*

Year.	Sex.	Average age of decedents. Years.	No of cases included.	Per Cent of Deaths in certain Age-groups.*							
				All Ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.
1896.	Males.....	.8	13	100	92.3	7.7	0	0	0	0	0
	Females.....	1.9	15	100	80.0	20.0	0	0	0	0	0

* On a preceding page, a foot-note to the sub-head under which this table appears, explains these age-groups.

*Average Duration of Whooping-cough.—Fatal and Non-Fatal Cases.*TABLE 12.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from Whooping-cough, in Michigan, during the year 1896. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Whooping-cough.											
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Deaths in each Period of Days.								
			All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
1896.	Males	5	100	0	20	40	0	0	20	20	0
	Females	6	100	17	17	0	0	17	0	33	17

From Table 12, it may be seen that of the 5 males and 6 females who were reported to have died from whooping-cough in 1896, and in which instances the interval between the day of being taken sick and the day of death was given, the largest per cent of males died between the eleventh and fifteenth days of sickness, and the largest per cent of females died between the thirty-first and thirty-fifth days of sickness.

The average duration of the fatal cases, in 1896, was 19.2 days for males and 29.7 days for females.

The instances where the duration of sickness of fatal cases of whooping-cough, which were reported in 1896, were too few to give any reliable information, but a continuation of this table for several years will show interesting facts as to the length of time fatal cases of whooping-cough are likely to last, and the time when grave symptoms may be expected and met by proper treatment.

The above remarks concerning the limited amount of material in this table of fatal cases holds true also for Table 13.

TABLE 13.—*Exhibiting by Sex of patient, the Duration (in days) of Non-Fatal cases of sickness from Whooping-cough, in Michigan, during the year 1896. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Whooping-cough.																	
Year.	Sex.	No. of cases in- cluded.	Duration of Sickness:—Per Cent of Cases in each Period of Days.														
			All Peri- ods.	1 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	61 to 65.	66 to 70.	71 to 75.	75 and over.
1896.	Males.....	195	100	4	7	3	5	7	7	10	10	5	8	7	8	4	16.
	Females.....	206	100	5	4	3	6	4	8	6	13	7	12	4	7	6	14

Table 13, shows that in non-fatal cases of whooping-cough for the year 1896, the duration of sickness in five-day periods showed an increased per cent in the period from forty-six to fifty days, and a large per cent in both sexes lasted over 75 days.

The average duration of the non-fatal cases, in 1896, was 50 days for both males and females.

The long reported duration is probably from the confusion of the characteristic cough with the duration of the disease.

The following information relative to the duration of the infection in cases of whooping-cough is quoted from the article by Charles W. Townsend, M. D., in the Reference Handbook of the Medical Sciences, Vol. VII, page 753:

"Whooping-cough is contagious during its whole course, especially during the hight of the disease in the second stage. It is least contagious during the third stage, or stage of decline, and its contagiousness may cease, while the cough, which is then due to a simple bronchitis, still continues. The contagiousness may even cease before the whooping has stopped, for this latter may be kept up simply as a nervous habit."

Long isolation, or confinement of the patient to the house, might delay convalescence and endanger the patient's general health, but before allowing a whooping-cough patient to mingle with other children, the body should be thoroughly cleansed and the child dressed in fresh clothing.

SMALL-POX (VARIOLA) IN MICHIGAN, IN 1896.

During the year ending December 31, 1896, there were reported to the Secretary of the State Board of Health 8 outbreaks of small-pox in 8 localities in Michigan which resulted in 38 cases with 16 deaths. For the same year (1896) there were reported to the Secretary of State 13 deaths from small-pox, or 3 less than were reported to this office.

TABLE 1.—*Exhibiting for each of the thirteen years, 1884-96, the number of reported Cases of and Deaths from Small-pox in Michigan; the number of localities where the disease was present, and the per cent of cases which proved fatal. Compiled in the Office of the Secretary of the State Board of Health, from reports made by local health officers*

Years.	No. of localities.	Cases.	Deaths.	Deaths per 100 Cases
1884	5	22	3	13.6
1885	9	27	6	22.2
1886	4	24	7	29.2
1887	2	4	0	0.0
1888	11	42	6	14.3
1889	14	57	4	7.0
1890	2	2	0	0.0
1891	3	3	0	0.0
1892	1	1	1	100.0
1893	2	10	3	30.0
1894	36	235	60	21.1
1895	21	187	47	25.1
1896	8	38	16	42.1
Total thirteen years	118	702	153	21.8

According to the Reports made to the Secretary of State.

Table 2 shows the number of deaths from small-pox per 10,000 persons living, reported to the Secretary of State. A diagram graphically representing the figures contained in this table for the 26 years, 1869-94, is printed on page 383 of the Annual Report of this Board for 1895.

TABLE 2.—*Exhibiting the number of reported deaths from Small-pox per 10,000 persons living in Michigan in each of the 28 years, 1869-96. Compiled from the Secretary of State's Vital Statistics of Michigan.*

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
Deaths.....	.38	.08	.61	2.40	.71	.14	.19	.53	.69	.04	.04	.02	.49	.58
Year.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths.....	.03	.02	.02	.03	0	.02	.02	.03	.01	.01	.01	.38	.31	.06

DISTRIBUTION OF SMALL-POX BY DIVISIONS AND COUNTIES DURING 1896.

Table 3 exhibits the distribution of small-pox in 1896, by divisions of the State, and Table 4 exhibits the reported small-pox by counties for the same year. Further on in this article is an exhibit of the cases and deaths in the localities in each county where small-pox occurred.

TABLE 3.—*Exhibiting the Population of Michigan for the year 1896, by tiers of counties (Upper Peninsula as one tier); also the numbers of cases of, and deaths from. Small-pox REPORTED from each of these divisions for 1896, and the numbers of cases and deaths per 10,000 population of each division.*

State, and Counties Grouped, by tiers, most Northern Counties First.			Population 1896 *	Reported Cases of Small-pox, 1896.	Reported Cases per 10,000 of Population.	Reported Deaths from Small-pox, 1896.	Reported Deaths per 10,000 of Population.
State			2,315,517	38	.16	16	.06
Upper Peninsula	Keweenaw. Chippewa. Ontonagon. Gogebic. Houghton. Iron Baraga. Dickinson. Marquette. Menominee. Alger. Delta. Schoolcraft. Mackinac. Luce.		219,561	0	0	0	0
Eleventh tier of counties.....	Emmet. Cheboygan. Charlevoix. Presque Isle.		44,907	0	0	0	0
Tenth tier of counties.....	Leelanaw. Autrim. Alpena. Otsego.		50,469	0	0	0	0
Ninth tier of counties.....	Montmorency. Benzie. Crawford. G'd Traverse. Oscoda. Kalkaska. Alcona.		44,715	0	0	0	0
Eighth tier of counties.....	Manistee. Ogemaw. Wexford. Iosco. Missaukee. Roscommon.		68,430	0	0	0	0
Seventh tier of counties.....	Mason. Gladwin. Lake. Bay. Osceola. Huron. Clare. Arenac.		161,297	2	.12	0	0
Sixth tier of counties.....	Oceana. Newaygo. Midland. Mecosta. Isabella.		94,010	0	0	0	0
Fifth tier of counties.....	Muskegon. Tuscola. Montcalm. Sanilac. Gratiot. Saginaw.		251,350	3	.12	0	0
Fourth tier of counties.....	Ottawa. Shiawassee. Kent. Genesee. Ionia. Lapeer. Clinton. St. Clair.		389,922	11	.28	2	.05
Third tier of counties.....	Allegan. Livingston. Barry. Oakland. Eaton. Macomb. Ingham.		232,834	0	0	0	0
Second tier of counties.....	Van Buren. Washtenaw. Kalamazoo. Wayne. Calhoun. Jackson.		525,805	21	.40	14	.27
First tier of counties.....	Berrien. Hillsdale. Cass. Lenawee. St. Joseph. Monroe. Branch.		232,233	1	.04	0	0

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the office of the State Board of Health.

TABLE 4.—*Number of Cases and Deaths reported from Small-pox per 10,000 persons living in each county in Michigan (from which Small-pox was reported) during the year 1896. (Compiled from reports of health officers, clerks, etc.)*

Counties.	Estimated population of Michigan for 1886.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated population of Michigan for 1886.*	Number of reported		Number per 10,000 population, of	
		Cases,	Deaths,	Cases,	Deaths			Cases,	Deaths,	Cases,	Deaths,
State	2,315,517	38	16	.16	.06	Lenawee	48,588	1	0	.21	0
Bay	63,750	2	0	.31	0	Saginaw	81,634	3	0	.37	0
Ionia	35,830	3	0	.84	0	St. Clair.....	55,429	4	1	.72	.18
Lapeer	28,712	4	1	1.39	.35	Wayne	310,135	21	14	.68	.45

* Population estimated by average annual increase, (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894.

Sickness-rates from Small-pox Reported as having Occurred in 1896.

Considering the State by tiers of counties, Table 3 shows that most of the sickness from small-pox in 1896 was in the southern part of the State. The city of Detroit seems to have been the principal focus of infection, it having a large majority of the cases.

Table 4 shows that the highest sickness-rate was in Lapeer county, 1.39 cases per 10,000 inhabitants. For the city of Detroit the sickness-rate was .76; for Wayne county excluding Detroit there was no reported small-pox.

Death-rates from Small-pox Reported as having occurred in 1896.

The highest death-rate from small-pox in 1896 was in Wayne county, .45 of one death per 10,000 population; the next highest death-rate was in Lapeer county, .35 of one death. The only other county where deaths occurred from small-pox, in 1896, was St. Clair, .18 of a death per 10,000 inhabitants.

NUMBER OF OUTBREAKS OF SMALL-POX IN EACH MONTH OF THE YEAR 1896.

TABLE 5.—*Exhibiting the reported number of outbreaks of Small-pox which Began, the number which Ended, and the number of outbreaks which were Present, in each Month of the Year 1896, in the different local jurisdictions of Michigan.*

[illegible]

The last line of figures, in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were the same number of beginnings as ending of outbreaks reported during the year 1896.

The first line of figures in Table 6, shows the number of cases reported sick in any part of each month.

As some of the cases were sick longer than one month they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1896.

The last line of figures, in this table (6), shows the per cent the cases sick in each month are of the exact number of cases *reported* to this Office for the year 1896.

TABLE 6.—*Exhibiting the Number and Per Cent of Cases of Small-pox in Michigan in each Month during the Year 1896. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases sick in any part of the month ...	2	22	10	4	0	0	0	0	0	0	0	0
Per cent the cases sick in each month were of total reported cases	5.3	57.9	26.3	10.5	0	0	0	0	0	0	0	0

SOURCE OF CONTAGIUM OF CASES OF SMALL-POX.

Of the 38 cases of small-pox reported during the year 1896, the local health officers reported the source of contagium as exhibited in the following table.

TABLE 7.—*Reported Source of Contagium of Cases of Small-pox in 1896.*

Traced to a former case	14
From Detroit	3
"Imported" *	21
All cases	38

*In Detroit there were reported to have occurred 21 cases of sickness, including 14 deaths, from small-pox in 1896, the source of contagium of which was stated as "Imported." Just what that term means, in this instance, is unknown, as the whole 21 cases were a continuation of the

outbreak which had been running in Detroit since 1894. The other 7 reported outbreaks in the State during this year, resulting in 17 cases and two deaths, were reported to have been traced directly or indirectly to contagium from Detroit.

MOVEMENTS OF CONTAGIUM OF SMALL-POX.

The following Table (8) shows the sources of small-pox contagium and the localities in Michigan to which the disease spread, as reported by health officers who were able to trace the contagium into their jurisdictions from localities outside the State, or from other jurisdictions within the State.

TABLE 8.—*First, second and third localities, where the second locality was infected with Small-pox from the first, and the third was infected from the second; and the numbers of cases and deaths from Small-pox in the first, second and third localities with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Small-pox was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Wayne county: Detroit City (Jan.-Apr.)	21	14	Ionia county: Ionia City (Feb. 15-Apr. 20.)	3	0	Lapeer county: Burlington township (Feb. 23-Mar. 4)	1	0
			Lapeer county: Imlay township (Feb. 10-Mar.)	3	1			
			Lenawee county: Riga township (Feb. 6-Mar. 1).	1	0			
			Saginaw county: Saginaw City (Feb. 10-Mar. 31.)	3	0			
			St. Clair county: Marine City (Feb. 4-Mar. 19.)	4	1			
						Bay county: Bay City (Mar. 10-Apr. 28.)	2	0

PERIOD OF INCUBATION IN SMALL-POX.

TABLE 9.—*Exhibiting the reported Period of Incubation, stated in days, in 31 cases of Small-pox. Compiled from reports of health officers in Michigan, for the year 1896.*

Incubation period—Days.....	12	14
Cases in each period.....	1	*30

* In 27 of these cases it was reported as about 14 days.

The average of the above 31 reported periods of incubation is 13.9 days.

Relative to two cases (not included in Table 9) the reported period of incubation was 13 to 14 days.

AGES OF GREATEST PREVALENCE OF, AND MORTALITY FROM SMALL-POX.

The reports of local health officers in Michigan for the year 1896, gave the ages of 18 persons who were sick with small-pox, and of 2 persons who died of that disease. Table 10 represents, in certain age-groups, the numbers of cases and of deaths from small-pox; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in special groups were of all deaths—compiled from all reports for the year 1896 which stated the ages.

TABLE 10.—*Exhibiting, in certain Age-groups, the number of Cases and the number of Deaths from Small-pox; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths; and the per cent that the deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1896, which stated the ages.*

Ages in groups of years.	Number and per cent of Cases and Deaths in certain Age-groups.												
	All ages.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	Over 60.
No. of cases	*18	1	1	1	8	3	2	1	0	0	0	0	1
Per cent the cases in each group were of all cases	100	5.6	5.6	5.6	44.4	16.7	11.1	5.6	0	0	0	0	5.6
No. of deaths	*2	0	0	0	1	0	0	0	0	0	0	0	1
Per cent the deaths in each group were of cases in that group	11.1	0	0	0	12.5	0	0	0	0	0	0	0	100
Per cent the deaths in each group were of all deaths	100	0	0	0	50	0	0	0	0	0	0	0	50
Per cent the deaths in special groups were of all deaths .....	.....	0	50	0	50	0	0	0	0	0	0	0	50

* Does not include those cases or deaths where the age was not stated.

By Table 10 it may be seen that the greatest number of cases of small-pox (where the ages were given) occurred in persons aged from 20 to 24 years; and that 13 of the 18 cases whose ages were reported, were between 20 and 34 years old.

AVERAGE DURATION OF SMALL-POX.—FATAL AND NON-FATAL CASES.

TABLE 11.—*Exhibiting by Sex of patient, the duration (in days) of fatal cases of sickness from Small-pox, in Michigan during the years, 1894-6. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Small-pox.										
Year.	Sex.	No. of cases included.	Duration of sickness:—Per cent of Deaths in each Period of days.							
			All cases.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.
1894.	Males.....	15	100	6.7	46.7	40.0	6.7	0	0	0
	Females.....	12	100	8.3	25.0	41.7	16.7	0	0	8.3
1895.	Males.....	13	100	7.7	38.5	23.1	15.4	0	15.4	0
	Females.....	5	100	0	60.0	20.0	0	20.0	0	0
1896.	Males.....	8	100	0	0	0	0	50.0	25.0	12.5
	Females.....	2	100	0	0	0	0	100.	0	0

The average duration of fatal cases of small-pox in 1896 was 11.4 days for males and 13.4 days for females.

TABLE 12.—*Exhibiting by Sex of patient, the per cent of cases which recovered in specified periods of time, the duration (in days) of Non-fatal cases of sickness from Small-pox in Michigan, during the years, 1894-6. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Small-pox.															
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Cases in each Period of Days.												
			All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.
1894.	Males.....	40	100	7.5	7.5	12.5	15.0	10.0	12.5	15.0	0	5.0	7.5	0	2.5
	Females.....	23	100	0	21.7	4.4	17.4	26.1	13.0	0	4.4	13.0	0	0	0
1895.	Males.....	36	100	0	5.6	16.7	11.1	22.2	13.9	16.7	5.6	2.8	2.8	0	2.8
	Females.....	33	100	0	0	9.1	9.1	21.2	24.2	15.2	0	12.1	0	3.0	3.0
1896.	Males.....	7	100	14.3	14.3	71.4	0	0	0	0	0	0	0	0	0
	Females.....	5	100	0	20	60	0	20	0	0	0	0	0	0	0

The average duration of non-fatal cases of small-pox in 1896 was 24 days for males. The only female case of which the duration was reported was sick 59 days.

OUTBREAKS OF SMALL-POX IN MICHIGAN IN 1896, BY LOCALITIES.

The following is a list of the 8 localities in Michigan where outbreaks of small-pox occurred in 1896; they are arranged alphabetically by counties, and the numbers of cases and deaths are given in each instance:—

Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Bay Co.:			Lenawee Co.:		
Bay City.....	2	0	Riga Tp.....	1	0
Ionia Co.:			Saginaw Co.:		
Ionia City.....	3	0	Saginaw City.....	3	0
Lapeer Co.:			St. Clair Co.:		
Burlington Tp.....	1	0	Marine City.....	4	1
Imlay Tp.....	3	1	Wayne Co.:		
			Detroit City.....	21	14
State.....				38	16

The following are detailed accounts of some of the outbreaks of small-pox in 1896, in which the facts reported appeared of sufficient interest and utility to demand such attention.

Small-pox in Bay City.

March 10, 1896. Wm. Kerr, M. D., health officer of Bay City, announced to this Office, by postal card, a case of small-pox in his jurisdiction. March 12, in reporting relative to the case, on the outbreak blank supplied by this Office, Dr. Kerr stated substantially as follows:—

"The disease was brought from Marine City. The patient is a female aged 22 years. The case has been isolated and placed under strict quarantine. Precautionary measures have been taken to prevent the spread of the disease.

"It seems that this girl S — F —, played cards, Feb. 27th, at the house of one Captain H — of Marine City, who it seems had been in a Detroit hospital under treatment for paralysis. It seems also that he had been afflicted with a sort of skin rash since returning, and had been treated at Marine City for eczema. I am inclined to think that Capt. H — must have had varioloid, because according to reports he was not confined to his house. The H — now sick with variola at Marine City is, we are told, a brother of Capt. H — who brought the disease from Detroit. I am under the impression that the girl said Capt. H — had been at St. Mary's Hospital, but am uncertain."

In his final report of this outbreak, Dr. Kerr stated that there had been two cases, both of which had recovered. The second case was brother of the first case and was exposed at the same time and place as the first case; but that he believed that the second case contracted the disease from the first case and not during the primary exposure.

Relative to the restrictive measures adopted in this outbreak, Dr. Kerr reported:—

"Left patients in their own house, put up cards and placed a special watchman night and day, and allowed nothing whatever to be taken out of the house. Employed physician and nurse."

Relative to disinfection, Dr. Kerr wrote:—

"Of the articles which came in contact with the sick persons, some were burnt, some disinfected in sublimate Sol. and fumigated with sulphur. The discharges were received into zinc and salt solution

and after disinfection thrown into running water closet. Nurses burned their clothing; all other things were sublimated and disinfected. All the contagium, such as scales from skin, was destroyed by fire as fast as produced; and disinfection with sublimate was going on all the time."

This outbreak was restricted to the two cases (in one family) first exposed.

Small-pox in Ionia city.

Feb. 16, 1896, H. Tremayne, M. D., health officer of Ionia city, reported to this Office the occurrence of a case of small-pox in his jurisdiction. Dr. Tremayne described the case as,—Bert Petingale, male, 19 years of age, taken sick Feb. 15, 1896. Dr. Tremayne further reported: "The disease was brought from Detroit. All persons exposed will be isolated. Precautionary measures have been taken by removing patient to pest house."

The following extracts from the "Ionia Daily Sentinel" of Feb. 17, 1896, give further details relative to this outbreak:—

"Ionia has a bad case of virulent small-pox. This was the announcement that rapidly spread over the city Sunday afternoon, and it didn't take long to confirm the report.

"Bert Pettengill, a young man about 22 years of age, who has always lived in this city, a son of George Pettengill, was sentenced to the Detroit House of Correction last fall from the Ionia circuit court for 90 days for horse stealing. It is supposed that he was released from 'Captain Joe's' boarding house Feb. 4, and according to Pettengill's story he was given a ticket at Lansing for Ionia Friday night, and reached here on the 10 o'clock train. The disease was undoubtedly contracted while he was in the Detroit House of Correction where it is prevalent. Bert says that he went to the D. G. H. & M. depot and stayed in the waiting room all night, and that he was picked up Saturday forenoon.

"Pettengill was arrested by Constable York, charged with being drunk Friday. However Pettengill says he did not visit a saloon after his return here, or on Saturday. He was arraigned Saturday in Justice Curry's court by Officer York on the above charge, and sentenced to 10 days in the county jail, where he was lodged at about 10 o'clock. He was placed in the jail proper with the other prisoners, where he remained about an hour and a half.

"When Pettengill was placed in jail he said he was sick. Deputy Locke says he was not drunk. Dr. Allen was called about noon, but the case was not far enough developed to fully satisfy him on the point. The doctor called again Sunday and at that time the patient was broken out from head to foot. Dr. Allen then made up his mind that it was a bad case of the small-pox, and so notified Health Officer Dr. H. Tremayne, who immediately went to the jail and made an examination. Dr. Tremayne fully concurred in Dr. Allen's opinion, and immediately took steps to avoid a spread of the disease. The mayor and common council were called together at the Bailey house, and the condition of affairs laid before them, but as Health Officer Tremayne, the proper officer, was doing all that could be done in the matter, it was left in his hands, and no action taken.

The first thing was the question of a pest house. The city has no place for an emergency of this kind, although it should have. Warden Fuller and Dr. Beckwith of the S. H. of C. were summoned to the hotel and they readily consented to allow the city to use the prison pest house on the flats south of the institution near the river. The consent of Mr. Hayes of the board of control of the S. H. of C., was also obtained. Officer Ed. Montgomery then went to Easton and obtained permission of Supervisor Minard, chairman of the board of health of that township, to remove the patient into Easton where the pest house is located. A load of wood and a heating stove were sent to the pest house by Supervisor Crawford and a fire kept there all Sunday night. Both Dr. Allen and Dr. Tremayne pronounce the case a bad one. Dr. Tremayne who has had some experience with small-pox patients, says it is the worst case he ever saw, so bad he thinks Pettengill must die. After Pettengill had been in the jail proper about an hour and a half, he was removed to the boys' department in the tramp annex, and here he remained until removed to the pest house. After everything was in readiness on the flats, preparations were made to remove him. This was no easy task, as it would be difficult to get a team. Finally Supervisor Crawford decided to have a big wooden box made to be filled with bed clothes, to load the patient in. The box was made at Hearsey's and Ted Callow's dray took it to the jail at about 10 o'clock this forenoon, but Ted didn't like to get any nearer and the box was left in the jail yard and another team had to be looked up.

"It was thought at first that there would be trouble in getting someone to take care of the patient at the pest house. Two were found who were willing to undertake the job, but John Owen who lives at the head of Second street, corner of Washington, was hired at \$3 per day. Mr. Owen went to the pest house this morning and got things ready, and about 11 o'clock returned to the jail after Pettengill. There was not a drayman in town that could be induced to carry him. Finally a farmer's wagon was obtained and then Pettengill was dressed. He was able to walk to the wagon and was placed in the box. This was supplied with a mattress and plenty of quilts. The quilts were securely wrapped around him in the cell. The box was made of rough boards and was about seven feet long and three-feet square. After Pettengill had been placed inside, the cover was put back in position, and it would seem as though there would be little danger from the transfer. Owen mounted the wagon and with his undesirable load started west on Washington street for the flats south of prison.

"After the box was unloaded at the pest house by Owen he drove the team out onto the flats and left it. Supervisor Crawford then brought the team back to the city. Mr. Crawford thinks there will be no further outbreak, unless at the jail, or from possible exposure Saturday morning before Pettengill was locked up, and both the supervisor and health officer are looking after the matter very carefully. The pest house was well stocked with provisions this morning, and Dr. Tremayne will keep it supplied hereafter. The council will meet tonight to take such action as is necessary.

"There is an anxious crowd of people at the county jail today, which has been quarantined by Health Officer Tremayne. When Pettengill was locked up Saturday there were 17 prisoners in the jail besides himself. These, with Deputy Sheriff Locke, and Turnkey Will Montgomery, are all in quarantine *for nine days at least*. No one is allowed by the health officer to enter or leave the jail without his order. The sheriff and children, and the employés, left the jail Saturday. Mrs. Hagadorn is doing the cooking for the 20 in quarantine. Health Officer Tremayne went to the jail this afternoon and vaccinated all that he could, and all other precautions are being taken to prevent an outbreak of small-pox. The doctors seem to be of the opinion that the disease had not reached a dangerous stage, and that there is no further danger, unless it possibly lies with those prisoners with whom Pettengill was confined. Big red cards marked 'Small-pox' are conspicuous on the outside doors of the jail, but there is not much danger of people approaching the place.

"While every precaution is being taken by the city authorities to prevent a possible spread of small-pox in Ionia, and such a thing is not even anticipated, owing to the early discovery and action in the matter, it is well enough for our citizens to be prudent and cautious in the matter. Take every step to blot out the unfortunate introduction of the disease. If you are not vaccinated, see your family physician at once and attend to the matter. Judge Davis called the attorneys together in the circuit court this morning, and after a discussion it was decided to excuse the jury for three weeks until March 9. While no danger is apprehended it was considered good policy not to bring the jurors and others here from all parts of the county for the next week or two. Judge Davis will probably hear motions, etc., but the general business of the court will be deferred until there is no possible chance for criticism or danger.

"There have been several cases of small-pox reported in different parts of the state during the last week, and they all seem to have originated at the Detroit House of Correction. This is certainly a deplorable condition of affairs that prisoners should have been released from that institution where small-pox is prevalent. New cases were reported there Saturday and the institution is now in quarantine, by direction of Health Officer Duffield of Detroit, and Sunday papers announced that no more prisoners would be released at present.

"Pettengill may have not only exposed the people of Ionia, but left his trail behind en route home. Deputy Sheriff Locke called up police headquarters at Lansing this forenoon, and found that Pettengill had not only spent two days in the capitol city, but had been confined in the police station there. It is needless to say that the chief of police at Lansing was not a little surprised and startled that he had just turned out one of 'Capt. Joe's' small-pox patients. Immediate steps were taken in the matter, and a telephone message from the Lansing Republican this afternoon gives us the information that Pettengill was sick two days in Lansing."

Finding it stated in the foregoing newspaper item that persons possibly exposed to the contagium of the disease, had been quarantined for *nine days*, the Secretary of this Board wrote to Dr. Tremayne as follows:—

"In the Ionia Sentinel, Feb 17, I notice it says 'All in quarantine for nine days at least,' I trust that this is a mistake, and that all will be kept under surveillance for at least two weeks from time of latest exposure to small-pox."

In reply to the last preceding letter, Feb. 20, 1896, Dr. Tremayne wrote as follows:—

"I received your letter today, and in reply would say that I visited Bert Pettingal today. * * * He says he left the House of Correction on the 5th of Feb., went to Owosso, stayed 2 or 3 days, then went to Lansing. On the 14th he came to Ionia. He is in a bad condition and I think will die."

At a meeting of the Common Council of Ionia, held Feb. 17, 1896, the following resolutions were unanimously adopted:—

"By Alderman Miller:

"Resolved, That Aldermen Bailey and Gallagher, act as a special committee in conjunction with the Mayor and Health committee to look after all cases of small-pox that may arise, with power to take such measures as are necessary to prevent the spread of the disease.

"By Alderman Banhagel:

"Resolved, That the Board of Health be authorized to order a general vaccination, all indigent or poor people to be vaccinated by the city health officer free of charge."

The following news item appeared in the Detroit Evening News of March 4, 1896:—

"Ionia, Mich., March 4.—Easy and Potter, who were taken to the pest house Saturday, have developed small-pox. Three ex-inmates of the house of correction came to Ionia yesterday. There is talk of legal proceedings against that institution."

There were no reported deaths in this outbreak, and no further spread of the disease after quarantine was established, the above-mentioned three cases being all that were reported to have occurred.

Small-pox in Burlington Township.

Feb. 17, 1896, J. T. Somerville, M. D., health officer of Burlington township, Lapeer county, wrote to the Secretary of this Board as follows relative to an outbreak of small-pox in his jurisdiction:—

"I have in my jurisdiction a family four of whom were exposed to small-pox for 24 hours on the 11th of this month. They were visiting away from home when exposed, and on their arrival home I immediately quarantined the house, and ordered the school closed because it was only 6 or 8 rods distant from the suspected house. As yet none of the inmates have shown any signs of being infected. Those exposed were vaccinated before returning home. I shall keep the house quarantined until the eighteenth or twentieth days, and report later if any cases occur."

In reply to Dr. Somerville's letter the Secretary wrote as follows Feb. 21, 1896:—

"I note what you say regarding the persons exposed to small-pox. I think your actions were correct. I should think that if you thoroughly disinfected exposed clothing and if you kept them under close surveillance for twenty days from last exposure it would be plenty. I do not know that you can legally isolate them, if they were successfully vaccinated. You could keep them under surveillance, and if any showed signs of the disease then you could isolate them. Under act 137 laws of 1883, I do not know that you have a legal right, and I do not think it absolutely necessary to close the school; but probably it will do no hurt from a public-health standpoint, although this Board would not recommend it under the circumstances you describe. Vaccination and re-vaccination of all persons exposed (probably on both arms) and vaccination and re-vaccination of all other persons in the vicinity not having been successfully vaccinated within the last five years, I think are the important measures for the restriction of the spread of the disease.

"I wish you would give me the names of those who were actually exposed away from home, and the place where they were exposed. And, if practicable the name of the person exposing them. Also any other information you may have regarding the outbreak."

Feb. 24, Dr. Somerville replied as follows to the above-quoted letter of the Secretary:—

"Yours of the 21st to hand, and at your request send the names of those exposed to small-pox on the 11th inst.

"W. Johnson, Martha Johnson, Cora Johnson, Cland Johnson (the last two are children of the first two), Alice Curtis and her baby.

"They show no signs of coming down with the disease as yet, therefore expect them all to escape.

"I might say that these were all exposed to it (small-pox) in Imlay Tp., Lapeer county, by a man by name of Henry Harvey who I understand brought it from House of Correction, *Detroit*.

"In regard to closing the school, I objected to it myself, but supervisor thought best to, it being so close and excitement in neighborhood was so great that very few would have attended.

"Will let you know if any come down later."

Feb. 26, Dr. Somerville again wrote to the Secretary as follows:—

"One of my patients (a little boy) broke out with a heavy rash this morning. The papules were quite numerous on forehead and very plentiful on wrists but the rash was pretty well scattered over whole extremities. I have pronounced it small-pox modified by vaccination, as it took well on all but the old man. The boy was very sick until the rash appeared and he has been feeling quite well since. Do not anticipate anything serious, and re-vaccinated the old man this morning."

Feb. 27, 1896, relative to this outbreak, H. A. Pulling, clerk of Burlington township, wrote to this Office:—

"We have a case of small-pox two miles from this village. The same has been reported to you by our health officer, Dr. Somerville. We have the roads fenced and have taken every precaution to quarantine them. Do you think it advisable to close village school, there being no children within one mile of small-pox case; also the revival meetings in the church here?"

Replying to Mr. Pulling's letter Feb. 26, the Secretary wrote:—

"I have written to the health officer requesting him to keep this Office constantly informed respecting the outbreak.

"Relative to the closing of the school and the revival meetings in the village of Clifford, the closing of schools and meeting, is such a confession of weakness and inefficiency on the part of the local health authorities to cope with a dangerous disease that this Board does not advise it. It is much better to quarantine the sick and infected persons, as the law contemplates, than to quarantine the whole community. If the proper prevention is applied, vaccination and re-vaccination of all persons not already thus protected, there will be no necessity for closing schools. Your board, and also the village board of health should offer free vaccination in accordance with Act 146, laws of 1879, and I herewith enclose a leaflet bearing upon that subject. The board should publicly recommend general vaccination and re-vaccination."

In his final report of this outbreak (dated April 6, 1896) Dr. Somerville stated substantially as follows:—

There was but one case, which recovered. The patient had been successfully vaccinated between the dates of exposure and of being taken sick, and to this fact may be attributed the light form of the disease,—Varioloid. Isolation was strictly enforced, and, at the proper time, thorough disinfection was practiced.

Small-pox in Imlay Township.

Feb. 13, 1896, Geo. W. Jones, M. D., health officer of Imlay township, Lapeer county, wrote as follows to this Office relative to an outbreak of small-pox in his jurisdiction:—

"I beg to inform you that an undoubted case of small-pox has made its appearance in the family of Stephen Harvey, in the village of Black's Corners, two miles north of this place [Imlay City]. The patient was sent up from Flint for stealing and spent some time in the Detroit House of Correction from whence he was recently discharged. Dr. Minard has the case in charge and I am doing all in my power to prevent the disease from spreading. Send me some small-pox literature."

Feb. 19, 1896, the Secretary of this Board wrote to Dr. Jones as follows:—

"Relative to the small-pox in your jurisdiction, I would like to receive a statement as to the exact date the patient was discharged from the Detroit House of Correction."

In reply to the Secretary's letter Dr. Jones wrote:—

"Referring to your inquiry of yesterday, I beg to say, that the small-pox patient Henry Harvey in my jurisdiction was discharged from the Detroit House of Correction on the 1st inst. He came directly to Imlay City and moved about freely until the 8th, since which date he has been confined to the house of his father, who resides at Black's Corners, 2½ miles distant from this village. He showed symptoms of illness on the evening of the 8th, and on the 9th Dr. Minard of Black's Corners treated him for La Grippe. He continued to grow worse and on the 11th a papular eruption made its appearance. Dr. Minard being in doubt as to the nature of the disease called me in on the 13th when I recognized its nature and immediately notified you and instituted active measures to restrict the disease. So far there has not been a second case; but the patient's mother today exhibits the premonitory symptoms, and other cases are expected to occur in a few days."

In reply to the last preceding letter from Dr. Jones, Feb. 21, the Secretary wrote:—

"Your letter of February 20, relative to small-pox is before me, for which please accept thanks.

"I trust that you will constantly keep this Office informed respecting the outbreak, by making weekly reports on blanks 'M' which were sent to you, and also by such other means as you may think necessary."

Feb. 25, Dr. Jones wrote:—

"Mrs. Harvey—Mother of Henry Harvey—the small-pox case previously reported, came down with the disease today, at least the eruption is characteristic. I think the third case in the same household is developing. The first case reported is progressing favorably. No cases so far in this village, and the danger period is about past."

Feb. 27, Dr. Jones again wrote to the Secretary:—

"Stephen Harvey, father of the young man discharged from the House of Correction on the 1st inst., came down with small-pox last night. The disease is reported to me by Dr. Minard as of a very malignant type. The eruption is copious and of a dark color. He has hiccough today and the doctor thinks he will not survive 48 hours. * * * The old gent (case No. 3) has been intemperate, and considering his age the prognosis is not favorable."

Feb. 28, Dr. Jones reported the death of Stephen Harvey (case No. 3 in this outbreak) and stated that no other cases had developed. Cases Nos. 1 and 2 recovered, so that in this outbreak there occurred three cases of the disease, of which one died.

In connection with this outbreak of small-pox at Black's Corners, D. V. Yerex, M. D., health officer of Imlay City village wrote to the Secretary of this Board as follows:—

"Dr. Minard of Black's Corners has been treating a patient for 5 days and today discovered it was small-pox of confluent type. He is also postmaster of the same town. The mail comes from there every other day to Imlay City, and I have ordered no mail to be delivered or carried from there. Am I right or wrong?"

Replying to Dr. Yerex, Feb. 14, the Secretary wrote:—

"I do not think that you have the right to stop the mail, but you could probably order the mail coming from Black's Corners to be disinfected before being delivered at your village, and I think that would be the better way.

"I think your board of health should offer free vaccination, and publicly recommend that all should be vaccinated and re-vaccinated, and especially all those who receive any mail by the way you mentioned and all who are in any way exposed."

Small-pox in Riga Township.

In this outbreak there was but one case,—Fred Shoemaker,—a young man 24 years of age who was taken sick Feb. 6, 1896, and who recovered March 1, 1896.

The first notice received at this Office of this case, was by telephone, from R. M. Eccles, M. D., health officer of Blissfield village, the attending physician in this outbreak.

The following letter, dated Feb. 11, 1896, received from Dr. Eccles, gives details relative to this case:—

"This morning I received your printed matter with reference to small-pox, for which accept thanks. Last Friday morning, Feb. 7th, I was called to see the case reported to you yesterday and found the patient suffering with marked symptoms of small-pox, severe pain of sacrum and frontal headache, high temperature. Knowing he had returned from the Detroit House of Correction on Thursday, Jan'y 30th, and that two cases had developed there, that week, I was satisfied that I had small-pox to deal with and ordered the house quarantined, and vaccinated all who had been exposed including myself. On Sunday the eruption appeared and last night he was thoroughly broken out with confluent variola. My reason for telephoning you was that the health officer of Riga Township, where the case is, insisted that it was compulsory for the attending physician to be quarantined and look after no other cases in his practice. I change clothing and disinfect thoroughly after each visit. I shall be pleased to give you any further particulars about the case that may come up."

Feb. 12, 1896, replying to Dr. Eccles' letter, the Secretary wrote:—

"I am very glad to know that you are using precautions to prevent the disease from spreading, and I shall be glad, at any time, to receive from you anything bearing upon the subject, or any other subject relating to public health interests."

March 16, 1896, Dr. Eccles again wrote to the Secretary as follows:—

"I am pleased to report that the small-pox patient reported from Riga has fully recovered, and that there have been no more cases. The prompt and efficient action of Riga Board of Health has very materially aided in the above good result. I did not make weekly reports as there were no other cases. Thanking you for promptly forwarding printed matter."

Small-pox in Saginaw City, W. S.

Details relative to this outbreak, gleaned from the health officer's reports, were substantially as follows:—

There occurred three cases, no deaths. The first case,—Maurice Brown, male, aged 20 years, was discharged from the Detroit House of Correction about Feb. 4, 1896. About Feb. 10, it was reported to the sheriff of Saginaw county that he was wandering around Burt (an unincorporated village of Taymouth township) "Acting strangely, as though he were insane." The sheriff caused him to be taken to the county jail. Arrived at the jail he complained of being sick. Medical aid was obtained, and later the disease developed and the local board of health took charge

of the case. There being no pest house in the city, a small boat house was procured and fitted up and used for that purpose, to which the patient was removed and every precaution taken to prevent the spread of the disease. The other two cases contracted the disease from the first case by contact with him in the county jail, before the nature of the disease was known. These last two cases with their nurse, were isolated in a separate house. As soon as it was known that the disease from which case one was suffering was small-pox, and that cases two and three had been exposed to it, these cases were vaccinated, but the vaccine, apparently, did not "work" in either case. They both, however, had varioloid, which modified form of the disease, may have been due to the vaccination. After the recovery of the patients the boat house in which the first case had been isolated, with its contents, and the clothes of all the patients and their nurses, were burned; and the house where cases 2 and 3 had been isolated was thoroughly disinfected. The period of incubation in the last two cases was reported as 14 days.

Small-pox in Marine City.

Four cases, of which one proved fatal, was the reported extent of this outbreak, the details relative to which are substantially as follow:—

March 9, 1896, F. Blagborne, M. D., health officer of Marine City, by telegraph, reported to the Secretary of this Board:—"William Hagan has small-pox. Just came to my notice. Many exposures. Advise us."

Replying to Dr. Blagborne's telegram, the Secretary telegraphed "Vaccinate every exposed person with active virus, both arms. Isolate all infected. Report freely."

On the same date (March 9) the usual "blue letter" of instructions relative to the restriction of the disease, and printed publications of this Board bearing on the same subject, were sent to Dr. Blagborne.

March 12, Dr. Blagborne wrote to the Secretary as follows:—

"In accordance with your instructions, all persons whom we can find to have been in any way exposed have been carefully vaccinated with fresh virus and kept under strict quarantine. No new cases have as yet developed, and the case is doing well, with good prospects of recovery. If new cases arise should the city establish a pest house? Do municipalities usually pay physicians for looking after such cases, or do they look to the patient for their pay as in other cases? What is the customary charge for visiting small-pox patients, and is it proper for physician to visit other cases while he has small-pox cases under treatment?"

"There has not been a case of small-pox in this vicinity in over 30 years, so you will excuse me if too inquisitive."

March 14, the following telegram was received by the Secretary from Dr. Blagborne:—

"City Council passed resolutions desiring schools and churches closed during quarantine. All have complied except catholic church. Small-pox originated among their members. Has health board authority to order said church closed?"

Replying to the last quoted telegram, the Secretary telegraphed:—

"I know of no law for closing any church. You better comply strictly with Act one thirty-seven, of eighteen eighty-three."

In reply to Dr. Blagborne's letter of March 12, the Secretary wrote, March 16, as follows:—

"Replying to your questions, I do not think any city should establish a 'pest-house,' but in accordance with the law, it should establish an isolation 'contagious-disease hospital.' I send you herewith a leaflet on the work of health officers in which I have marked parts bearing upon the different questions asked by you.

"If Marine City were not in St. Clair county, I think, if the patient or his friends were not able, that the expense would be upon the county; but the last legislature made St. Clair county an exception to that law, making the locality liable, when the patient or those liable for his support, are not able.

"I think the customary charge for attending physician is ten dollars per day, because *such a physician ought to give up all other practice for the time being*. If he does continue his practice, or does mingle with the public he should thoroughly disinfect his person, clothing, beard, hair, etc. I send you a leaflet relative to such disinfection.

"Because of vaccination, in addition to isolation and disinfection, small-pox is the easiest disease to restrict. I hope you will give the same or more effort to the restriction of the other diseases which cause more deaths in Michigan.

"In accordance with your suggestion by telephone, March 13, I telegraphed the health officer of St. Clair 'Health officer of Marine City reports only one case of small-pox. Every infected person isolated. No danger of spread.'"

March 16, the Secretary wrote to Dr. Samuel P. Duffield, health officer of Detroit, as follows:—

"The health officer of the city of Marine City informs me that the case of small-pox in that city was contracted 'from a brother who contracted it in a very mild form in Detroit and recovered without notice.'

"The health officer of Bay City informs me that 'Mr. Hagan now sick with variola at Marine City is, we are told, a brother to Capt. Hagan who brought the disease from Detroit. I am under the impression that the girl said Capt. Hagan had been at St. Mary's Hospital. 'The girl' is the person now sick with small-pox at Bay City, having contracted small-pox while playing cards with this Capt. Hagan at Marine City, Feb. 27.

"I write to ask how it can be that this Mr. Hagan could have contracted the disease while at St. Mary's hospital? I shall be glad to have any information you may be able to gather on the way in which Capt. Hagan contracted the disease in Detroit. I send the statements thinking also that they may in some way be useful to you in your work in Detroit."

In reply to the Secretary's letter, March 17, Dr. Duffield wrote:—

"Your letter relative to Capt. Hagan's case and the Marine City case is at hand. There has been no case of small-pox in St. Mary's Hospital since June 20, 1894, the case being at once removed to the Contagious Disease Hospital (small-pox hospital). Dr. Inglis who treated Capt. Hagan while in the hospital was seen by me this morning and he gives the following data, and says he treated Capt. Hagan for paralysis: Capt. Hagan entered St. Mary's Hospital suffering from paralysis. Entered January 11th, and was discharged February 5th. He was given iodides pretty freely and may have had an iodide rash upon him, but Dr. Inglis claims he was free from any such disease as small-pox. That he had a paralytic trouble requiring the use of iodides. Your health officer nowhere states that he had positive proof that Capt. Hagan was suffering from small-pox. If he drew his conclusions from the fact that he had a rash on his face he has been unjust. We have had nothing in St. Mary's since June 20, 1894."

March 18, the Secretary wrote as follows to the Medical Superintendent of St. Mary's Hospital, Detroit:—

"Capt. Hagan of Marine City entered your hospital Jan. 11th and was discharged Feb. 8, and is now sick (at Marine City) with, or recovering from small-pox which has been spread to other persons.

"I understand that June 20, 1894 there was a case of small-pox at St. Mary's Hospital. Will you kindly inform me whether or not Capt. Hagan occupied the same room in which there was small-pox in June, 1894? Can you explain or give any facts which will help to explain the source of contagion in this case of Capt. Hagan?"

March 19, J. H. Sloane, M. D., House Surgeon at St. Mary's Hospital, replying to the Secretary's letter wrote:—

"Yours of 18th inst. at hand. We had a case of small-pox in one of the medical wards about the time you mention which was removed as soon as recognized to the pest house, and the ward and patients treated according to the health laws of the State by Dr. Schulte who was at that time health officer. Capt. Hagan occupied a room in the other end of the hospital far removed from that ward. We cannot see any connection between his present condition and that case of nearly two years ago, particularly so when all the requirements of the law were thoroughly carried out at that time and no other case has developed since."

March 19, 1896, W. E. Bostwick, M. D., health officer of Algonac village, wrote to the Secretary as follows:—

"I have been informed that small-pox prevails in the city of Marine City. I wish you would let me know what authority I have to prevent people who may have been exposed from coming to our town. Have I the authority to compel families moving from Marine City here to bring me a certificate of not having been exposed, from the local board of health at Marine City? I would also like to know if it will be necessary for me to order a general vaccination."

In reply to Dr. Bostwick's letter, March 21, the Secretary wrote:—

"Replying to your letter of March 19, I send you herewith a copy of the pamphlet on the work of health officers and local boards of health. If your township wishes to do so, it can frame and publish rules which shall regulate the movement of persons possibly infected with any disease, in accordance with sections 1636 and 1639 Howell's Statutes. In accordance with Act 137, laws of 1883, you could order (in your township) the prompt isolation or vaccination of those persons who have been exposed to small-pox, but it is at the discretion of such persons whether they shall be vaccinated or isolated. However, I think it would be well for your board to publicly *recommend* a general vaccination and re-vaccination of all persons not having been successfully vaccinated within the last five years. In accordance with Act 146, laws of 1879, your board might *offer* free vaccination and re-vaccination."

March 19, the following telegram was received from Dr. Blagborne:—

"Should we quarantine ministers or priests after visiting small-pox patients or will thorough disinfection be sufficient to allow them to mingle with the public?"

The same date the Secretary replied:—

"Ministers, priests, and persons are all alike under the law"

The Secretary received the following letter, dated March 15, from A. E. Thompson, M. D., of St. Clair:—

"I have been attending Capt. Hagan, suffering from variola, in Marine City. Saw him yesterday which was the 11th day of the eruption and 15th day of his illness. The pustules are drying up and the scabs are coming off. When will it be safe to discharge him from quarantine? Also inform me when the nurse who has been waiting on him, and Dr. Degurse the attending physician who has been quarantined with Hagan, can be discharged taking the necessary disinfecting precautions?"

March 18, replying to Dr. Thompson's letter, the Secretary wrote:—

"Relative to when the patients can be safely released from quarantine, in Quain's Dictionary it is stated that 'The patient may be discharged safely when the crusts and scales have disappeared, and not less than six baths have been given, at intervals of two days.'"

The average duration of infectiousness in small-pox, after apparent complete recovery, is about six weeks, so that should be the shortest time for the isolation of the patient, provided that efficient disinfection has been done.

"Those who have been exposed to the disease, but did not contract it may be released from isolation after the fourteenth day from last exposure, providing their clothing and bodies have been disinfected."

In his final report relative to this outbreak, the health officer gave as the source of contagium in the first case "Contracted at St. Mary's hospital, supposed to have come from a nurse who was out at pest house

in January." The other three cases, "by exposure to first case." All the cases (except the one who died and who had objected to the operation) were vaccinated after exposure to the contagium. All the cases occurred in one house in which they, their nurse and attending physician were isolated. There was no spread of the disease from this house. The period of incubation in the last three cases was reported as "about 14 days." Thorough disinfection was said to have followed death and recovery of the patients.

Small-pox in the City of Detroit.

The 21 cases of sickness and the 14 deaths from small-pox which were reported as having occurred in Detroit during the year 1896, were a continuation of the outbreak of that disease which began in May, 1894, continued through 1895 and ended in 1896; the last case being reported as having taken sick April 11, 1896.

A full history of this outbreak is given in this and previous annual reports of the Secretary of this Board,—Reports for 1895, pp. 406-408; 1896, pp. 377-378; 1897, p. li; and further details relative thereto are contained in the following extracts from correspondence of this office:—

The Detroit House of Correction being the center from which the contagium spread, directly or indirectly, to a large part of the small-pox infected localities of the State, Feb. 17, 1896, the Secretary of this Board wrote to Dr. Duffield, health officer of Detroit, as follows, relative to this subject:—

"I think that there should be something done to prevent the discharged prisoners from spreading small-pox to other parts of this State, as Ionia is the fourth locality that has become infected in this way. It seems to me that no prisoner should be allowed to leave the House of Correction, or at least your jurisdiction, until there is no danger of his communicating small-pox."

Feb. 18, the Secretary wrote as follows, on the same subject, to Capt. Joseph Nicholson, superintendent of the Detroit House of Correction:—

"The cause of four recent outbreaks of small-pox in Michigan seems to have come from the Detroit House of Correction; one case so far reported at each of the following named places: Riga township, Lenawee Co.; Saginaw city; Imlay township, Lapeer Co., and Ionia city. The person at Ionia spent three nights in the jail in this city, Lansing.

"There should be some way to prevent small-pox or any other disease dangerous to the public health from being spread from such a penal institution; but we recognize the fact that there may be no law which would enable you to keep such persons at the House of Correction longer than their term of sentence. If it is possible, I sincerely hope you will do so. If it is not possible, will you kindly give the health officer of the city of Detroit such timely notice of the prospective departure of persons sick with or possibly infected with small-pox, that he may take action which will prevent spreading the disease about the State? Under present circumstances, it is my judgment that you should notify the health officer of the prospective departure of every person who goes out from your institution."

Feb. 17, 1896, in reply to the Secretary's letter, Dr. Duffield wrote:—

"The House of Correction has been quarantined since the first case I detected there and took to our hospital for small-pox. I ordered the superintendent at that time, to see that none of the prisoners were allowed to leave, even should their time of service expire. We hold them 16 days from the time of last exposure. An effort will be made to have a habeas corpus, but I do not think any judge will take it upon himself to issue one if there is danger of spreading the pestilence.

"These cases which have come down in the State, developed after leaving the House of Correction and before it was known they had been exposed. They all came down within a few days of each other.

I mean those who became sick in the State, fell ill at the same time that the sickness broke out in the House of Correction. There is no doubt in my mind but what they were all exposed at the same time to the disease—but their time of service expired before the incubation period was finished, they were allowed to go and at a time when none had shown sickness in the prison. I have everything well under control, prisoners vaccinated and hope to have the trouble abolished in the next two weeks, as the vaccinations will have then taken effect."

Feb. 19, the Secretary again wrote to Dr. Duffield:—

"Relative to the small-pox at the house of correction, I note what you say—'They all came down within a few days of each other.' But your last remark—'Those who became sick in the State, fell ill at the same time, that the sickness broke out in the house of correction,' must be an error, because according to the newspapers, small-pox was present at the house of correction as early as Feb. 7, and the man Pattengill who came here and then went to Ionia seems to have been taken sick about Feb. 14, but I suppose it is possible that he may have left the house of correction before Feb. 7.

"I am very glad to know that you have everything 'well under control, prisoners vaccinated, and hope to have the trouble abolished in the next two weeks.'"

Feb. 19, in reply to the Secretary's letter of Feb. 18, Capt. Nicholson wrote:—

"Answering yours of yesterday I will state: When the persons you refer to as being down with small-pox at the places you name were discharged from here, we did not know that any one here was afflicted with small-pox. When we did discover it, every known precaution was taken to prevent its spread. All that we thought that were exposed were at once isolated; every person was vaccinated; every cell, cell-house and work-shop thoroughly fumigated; clothes of convicts taken off, steamed and washed (I am well fixed for steaming). All this had my personal attention and I know it was well done. We have not stopped these measures, although no apparent necessity for them. After consultation hunting authority for me to not discharge any person when their time expired no authority could be found. I applied to Health Officer Duffield, and he gave me a written order to discharge no person after their term had expired until the dangerous period from exposure had expired, and then only after examination by him and his order to discharge; so no person has been discharged since Saturday the 8th instant, nor will there be any more discharged until we are thoroughly satisfied there is no danger to the public health in doing so. We have quarantined all whose time has expired in our East Hall, which was not in use, as not needed, and which is shut from other parts of the building. All quarantined are in good health, having a good time, well cared for, only no employment. The vaccination has taken effect in nearly every case, and those that did not take were revaccinated; and as we have no suspects in other parts of the prison, we are confident of having stopped the further spread of the disease.

"I have been sharply criticised for my action in holding persons after their term has expired. Whether legally right or not, I believe that the health of the people with whom these men would come in contact, is of greater importance than a few days detention of any of these men. The necessity exists for such action under the circumstances as often exists for declaring martial law, and I think my action will be upheld by every good citizen."

Following are extracts from letters subsequently received from Dr. Duffield:—

"Feb. 26, 1896: Today we begin releasing persons who have been held in quarantine 16 days since last exposure and who have had successful vaccinations during the time of quarantine. In addition to the names having been given, I have asked Superintendent Nicholson to let me know their destinations and will see that the health officer of the place to which they are sent is informed of all the circumstances of their discharge. No cases in the woman's department."

"Feb. 29, 1896: The prisoners now being released from House of Correction, have been quarantined 16 and 18 days from last exposure, have been successfully vaccinated, all arms have well taken. Their clothing been subjected to steam under 20 pounds pressure for two hours and they can be considered as free from any contagion of small-pox."

"March 10, 1896: The following prisoners have been released from the Detroit house of Correction and are safe from communicating any contagion, having been quarantined at least twenty days from last exposure, and I have notified Health Officers at the different places."

The prisoners mentioned by Dr. Duffield were twelve, destined for ten localities in Michigan.

Jan. 17, 1896, the "Detroit Journal" contained the following item:—

"December 30 last Dr. Duffield diagnosed the case of Clara Paquette, 171 Porter street, as small-pox.

"On the same day Dr. Jay W. Morrison diagnosed the case as chicken-pox.

"Dr. Duffield ordered the girl taken to the pesthouse, which was done.

"January 13—Miss Paquette was discharged from the pest house as cured.

"January 14 about 11 o'clock at night Jack Priest called Dr. Duffield up by telephone and told him that Miss Paquette had small-pox. He called up so many times that Dr. Duffield called police headquarters and asked that Priest be locked up as drunk.

"January 15 an investigation of the case was made by Dr. Duffield.

"January 17 a final diagnosis was made of the case by Dr. Duffield. He decided it was small-pox and Miss Paquette will be again removed to the pest house tomorrow.

"Priest has lived around small-pox for months, having been the engineer at the pest house, taken the patients there and hauled away the dead. One good look convinced Priest that she had the small-pox and he so telephoned Dr. Duffield, and later Dr. Longyear.

"Detective Baker, after hearing from Dr. Duffield, found Priest, who was perfectly sober. The next day the health officer discharged Priest and ordered him to give up his police badge.

"Jack Priest the faithful employé, who was wrongfully accused of being drunk and who says his only offense was discovering a case of small-pox and reporting it, has not been returned to his duties.

"An arrangement has been made whereby Dr. Jay W. Morrison, as the family physician, shall attend Miss Paquette, while she is at the pest house this time.

"Dr. Duffield states that Dr. Herman Kiefer also diagnosed the case as small-pox in the first instance, and still maintains that it was small-pox. He also states that January 15 Drs. Kiefer and Sargeant assisted him in diagnosing the case, and at that time there was no evidence of small-pox.

"Jack Priest was discharged for more reasons than one, said the health commissioner."

The following item appeared in the "Detroit Evening News" of Jan. 21, 1896:—

"At a meeting of the Detroit Medical and Library Association Dr. T. A. McGraw called attention to the criticisms of Dr. Duffield for diagnosing a case of small-pox as chicken-pox.

"Resolutions were adopted which contained the emphatic assertion that it is impossible for medical men to be infallible in diagnosing eruptive diseases, and further stated that the tendency on the part of the public to hold that doctors must be infallible will prove disastrous to the service."

A representative of a Detroit newspaper interviewed the Secretary of the State Board of Health on this subject, with result as follows:—

Secretary Baker, of the State Board of Health, being asked if he coincides with the view of the Detroit Medical Library Association resolutions relative to Dr. Duffield, said he thought infallibility should not be expected of health officials; that in case of doubt whether a given case of sickness is or is not small-pox, there can be no question that the public safety should be given the benefit of the doubt; and especially as there is no need that the life of the person suspected to have small-pox should be jeopardized; and if the proper action is taken it will not be jeopardized. The health officer should not order or permit any such person to be exposed to small-pox except that person has *recently* been successfully vaccinated, or at least *recently* vaccinated with virus known to be active. If the suspected person proves to have small-pox the vaccination will do no harm, while if the vaccination develops and is successful, it demonstrates that the person did not have small-pox, and at the same time supplies protection against that disease.

The proper action—*vaccination*—should be understood, and acted upon next time.

It was reported that Miss Paquette died of the small-pox.

CHICKEN-POX (VARICELLA) IN MICHIGAN IN 1896.

During the year ending Dec. 31, 1896, the presence of chicken-pox at nine localities in Michigan, was reported to the State Board of Health. One hundred and twenty-three cases of the disease were reported to have occurred in eight of those localities, as follows:—Detroit city, 19 cases; Kalkaska village, Kalkaska county, 1 case; Lansing city, 1 case; Wayne village, Wayne county, 7 cases; Riverton township, Mason county, 1 case; Kalamazoo city, 2 cases; Grand Rapids city, 90 cases; Big Rapids city, 2 cases. The health officer of Columbiaville village reported the disease *epidemic* in his jurisdiction, but did not state the number of cases which had occurred.

Relative to the case in Lansing there was some doubt as to whether the disease was chicken-pox or varioloid. The patient was, however, quarantined and vaccinated, and the disease did not spread. Relative to the outbreaks in Kalkaska and Wayne villages, the health officers reported that the patients were quarantined and all precautionary measures were taken to prevent the spread of the disease. From the other localities the reports were made on annual reports and no details of the outbreaks were given.

SUMMARY OF FACTS RELATING TO THE DANGEROUS COMMUNICABLE DISEASES, IN MICHIGAN DURING LONG SERIES OF YEARS ENDING WITH THE YEAR 1896.

On pages 152 and 153 of this Annual Report, reference is made to the aims of this Board in collecting and publishing statistics relative to the dangerous communicable diseases in Michigan.

In furtherance of the aims there mentioned, the Secretary of this Board has, for a number of years, caused all reports to this Office from health officers and other reliable sources, relative to dangerous communicable diseases, to be analyzed, the information contained in them classified each year, and the results published under appropriate heads, in the Annual Reports of the Board.

In the following pages is summarized information thus collected through several years, relative to some of the most important diseases; and it is presented in concise form for the information of the public generally, and for the use of those specially interested in the statistical study of the communicable diseases and the progress made in controlling and preventing them in Michigan.

PREVALENCE OF THE DANGEROUS COMMUNICABLE DISEASES IN MICHIGAN.

General Prevalence.

Table 1 exhibits the annual average numbers of cases of sickness and deaths reported to this Office as having occurred in the State from the principal communicable diseases during specified periods; also the ratios those averages bear to the annual average population of the State for the same periods.

By Table 1, it may be learned that, according to the reports, if arranged in order, the disease which caused most sickness first, and naming the diseases in the order of amount of sickness, the diseases rank as follows:—(1) Measles, (2) Scarlet Fever, (3) Diphtheria, (4) Whooping-cough, (5) Typhoid Fever, (6) Consumption, and (7) Small-pox; also that, if arranged in order, the disease which caused most deaths first, and naming the diseases in the order of numbers of deaths, the diseases rank as follows:—(1) Consumption, (2) Diphtheria, (3) Typhoid Fever, (4) Scarlet Fever, (5) Measles, (6) Whooping-cough and (7) Small-pox.

The order of greatest fatality (*i. e.* the per cent of cases which proved fatal) from the various diseases, was as follows:—Consumption 74, Diphtheria 22, Small-pox 22, Typhoid Fever 18, Scarlet Fever 6, Whooping-cough 3, and measles 1 per cent of reported cases.

A diagram (No. 893) showing the average annual sickness and death rates from the seven most dangerous communicable diseases in Michigan for various periods all ending with 1895, is printed on page 405 of the Annual Report of this Board for the year 1896.

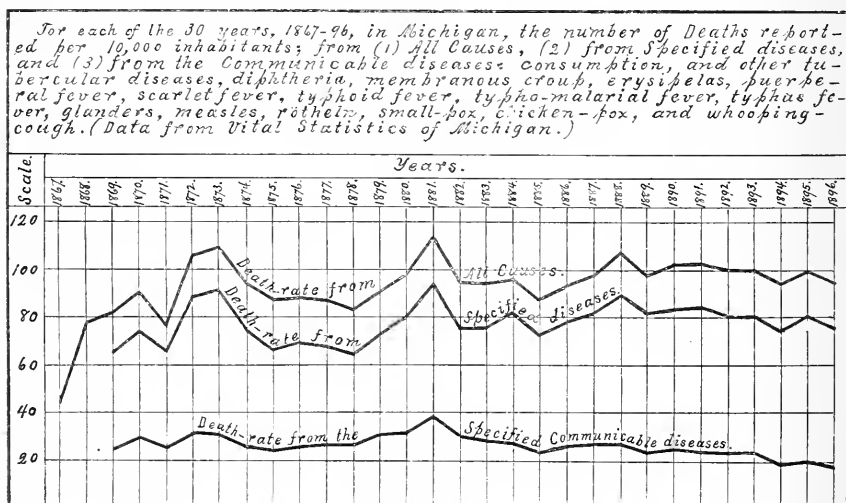
The diagram (No. 938) here given, shows, for a long series of years, the comparative death-rates in this State (1) from all causes, (2) from *all* specified diseases, and (3) from specified *communicable* diseases.

TABLE I.—*Exhibiting for the several Dangerous Communicable Diseases for specified periods of years, the Average Annual Numbers of Reported cases of Sickness and Deaths which occurred in Michigan: also the Average Annual Sickness rates and Death rates per 10,000 Inhabitants from those Diseases for the given Periods of Years.*

Diseases.	Number of years over which each period extends.	For each Period, Average Annual:			
		Estimated population.	Reported.		Per 10,000 population.
			Cases.	Deaths.	
Diphtheria	11 years, 1886-'96.	2,128,009	3,859	861	18.13
Scarlet Fever	" "	2,128,009	4,883	247	20.60
Typhoid Fever	" "	2,128,009	2,583	461	12.14
Measles	7 years, 1890-'96.	2,204,703	9,292	101	42.15
Whooping-cough	10 " 1887-'96	2,147,436	3,235	82	15.06
Small-pox	11 " 1886-'96.	2,128,009	59	13	.28
Consumption	4 " 1893-'96.	2,260,110	2,079	1,539	9.20
					6.81

Study of this diagram reveals the fact that while the death-rates from *all* causes and from *all* specified diseases have not decreased, the death-rate from the specified *communicable* diseases has decreased, reaching its lowest point in 1896.

For reasons hereafter stated, 1881 was an epidemic year for all diseases in Michigan, and especially so for diphtheria. Since the year 1881 the diagram indicates a decrease in death-rates, and this is notably the case relative to the specified communicable diseases, the uniformity of the line representing which shows a steady decrease in the death-rates from those diseases, and indicates that the plan of restrictive measures introduced into Michigan has worked beneficially in checking epidemic rises, and in bringing those diseases under better control. It is believed and hoped that as the Michigan restrictive plan becomes more generally adopted good results therefrom will be proportionately developed.



Geographical Prevalence (Distribution) of Diphtheria, Scarlet Fever, Typhoid Fever and Measles in Michigan.

The tables 2, 3, 4 and 5 exhibit the distribution of diphtheria, scarlet fever, typhoid fever and measles reported throughout the State during certain periods of years, and facilitate the study of the geographical prevalence of those diseases, and their comparative prevalence in the different counties of the State.

These tables exhibit, for each county, and for specified periods of years, the *average annual* population, the *average annual* numbers of reported cases and deaths from each disease, and the ratio those cases of sickness and deaths bear to the annual average population of the counties in which they occurred.

Maps graphically representing tables similar to tables 2, 3, 4 and 5, constructed from data extending to 1895, are printed on pages 410*a* to 410*d* of the annual report of this Board for 1896.

Table 2 shows that from diphtheria during the eleven years, 1886-96, according to the reports, the greatest sickness-rate existed in Roscommon county, and the least in Baraga county. The greatest death-rate existed in Roscommon county and the least in Baraga and Gladwin counties.

Table 3 shows that from scarlet fever during the 11 years, 1886-96, according to the reports, the greatest sickness-rate existed in Keweenaw county, and the least sickness-rate in Baraga county. The greatest death-rate existed in Marquette county and the least in Baraga and Presque Isle counties.

Table 4 shows that for typhoid fever during the 8 years, 1889-96, according to the reports, the greatest sickness-rate existed in Baraga county and the least in Crawford. The greatest death-rate existed in Baraga county and the least in Mackinac and Montmorency counties.

Table 5 shows that for measles during the 8 years, 1889-96, according to the reports, the greatest sickness-rate existed in Benzie county, and the least in Wayne. The greatest death-rate existed in Keweenaw county and the least in Alger, Crawford, Emmet, Gogebic, Lake, Lapeer, Leelanau, Mackinac, Montmorency and Ogemaw counties, in which no deaths occurred.

SEASONAL SPREADING OF DIPHTHERIA, SCARLET FEVER, TYPHOID FEVER AND MEASLES.

Table 6 shows the total numbers of reported new outbreaks of diphtheria, scarlet fever, typhoid fever and measles, of which the dates of beginning were reported to this office as having occurred during specified periods; and the number of those outbreaks which began in each month of the year.

TABLE 2.—*Exhibiting the Annual Average Population, the Annual Average Numbers of Cases of Sickness and Deaths reported from Diphtheria, and the Annual Average Reported Numbers of Cases and Deaths per 10,000 persons living in each county in Michigan during the eleven years, 1886-96. (Compiled from reports of health officers, clerks, etc.)*

State and counties.	Annual average population of Michigan for 1887-96.	Annual average number of reported		Annual average number per 10,000 population, of reported		Counties.	Annual average population of Michigan for 1887-96.	Annual average number of reported		Annual average number per 10,000 population, of reported	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,128,003	3,859.45	861.27	18.14	4.05	Keweenaw	3,114	7.64	1.64	24.53	5.27
						Lake	6,372	12.55	2.55	19.70	4.00
						Lapeer	29,099	38.73	9.45	13.31	3.25
Alcona	5,204	11.91	3.45	22.89	6.63	Leelanau	8,544	7.45	1.36	8.72	1.59
Alger	1,223	3.19	1.00	26.08	8.18	Leauwee	48,665	33.45	7.00	6.87	1.44
Allegan	39,025	42.27	10.45	10.83	2.68	Livingston	20,765	29.73	5.45	14.32	2.62
Alpena	16,161	22.18	3.55	13.72	2.20	Luce	2,295	2.82	.55	12.26	2.40
Antrim	11,123	9.00	2.73	8.09	2.45	Mackinac	7,144	5.64	1.27	7.89	1.78
Arenac	6,033	32.91	5.35	54.55	8.87	Macomb	32,009	50.64	9.91	15.82	3.10
Baraga	3,607	.27	.00	.75	.00	Manistee	24,470	23.18	5.18	9.47	2.12
Barry	23,79	24.55	5.09	10.32	2.14	Manitou	939	.00	.00	.00	.00
Bay	57,960	159.73	30.73	27.56	5.30	Marquette	36,472	55.82	13.18	15.30	3.61
Benzie	6,457	8.45	1.18	13.09	1.83	Mason	16,877	31.73	6.73	18.80	3.99
Berrien	42,830	51.55	12.64	12.04	2.95	Mecosta	20,326	12.82	3.73	6.31	1.84
Branch	26,644	36.66	8.33	13.76	3.14	Menominee	26,394	73.36	13.13	27.79	4.97
Calhoun	45,106	43.73	8.09	9.69	1.77	Midland	11,594	47.91	8.45	41.32	7.29
Cass	21,097	13.27	2.73	6.29	1.29	Missaukee	5,707	.55	.18	.96	.32
Charlevoix	10,250	4.45	2.18	4.34	2.13	Monroe	32,894	58.73	11.00	17.85	3.34
Cheboygan	12,590	52.27	10.91	40.72	8.67	Montcalm	33,775	21.36	5.45	6.32	1.61
Chippewa	12,996	19.73	4.13	15.18	3.18	Montmorency	1,844	8.91	1.45	48.32	7.86
Clare	7,453	8.73	1.45	11.71	1.95	Muskegon	38,357	93.18	19.00	24.29	4.95
Clinton	26,486	32.27	6.25	12.18	2.36	Newaygo	19,607	19.09	6.00	9.74	3.06
Crawford	2,755	6.64	1.91	24.10	6.93	Oakland	41,906	43.09	8.37	10.28	2.60
Delta	16,398	5.54	1.36	3.38	.83	Oceana	15,949	16.45	4.82	10.31	3.02
Dickinson	14,607	24.91	5.91	17.05	4.05	Ogemaw	5,314	5.09	1.73	9.58	3.26
Eaton	32,300	32.00	5.91	9.91	1.83	Ontonagon	5,479	14.36	2.64	26.21	4.82
Emmet	9,513	3.45	1.27	3.63	1.34	Osceola	15,415	21.00	5.64	13.62	3.66
Genesee	39,867	42.55	7.45	10.67	1.87	Oscoda	1,777	1.73	.36	9.74	2.03
Gladwin	4,134	1.45	.00	3.51	.00	Otsego	4,466	17.91	4.09	40.10	9.18
Gogebic	12,704	11.42	3.45	8.99	2.72	Ottawa	37,267	55.36	11.27	14.85	3.02
G'd Traverse	15,149	20.18	4.18	13.32	2.76	Presque Isle	5,177	7.64	2.55	14.76	4.93
Gratiot	28,171	12.09	2.82	4.29	1.00	Roscommon	1,938	14.36	3.55	74.10	18.32
Hillsdale	30,630	50.55	6.18	16.50	2.02	Saginaw	80,936	150.82	31.73	18.63	3.92
Houghton	38,173	61.73	11.09	16.17	2.91	Sanilac	32,781	52.91	12.73	16.14	3.88
Huron	23,707	83.55	17.82	23.12	6.00	Schoolcraft	6,042	6.55	2.55	10.84	4.22
Ingham	38,218	42.42	10.91	11.10	2.85	Shiawassee	31,424	57.55	7.82	18.31	2.49
Ionia	33,728	34.09	7.00	10.11	2.08	St. Clair	52,356	88.82	18.91	16.96	3.61
Iscosco	13,147	32.55	6.00	24.76	4.56	St. Joseph	25,367	12.46	2.36	4.91	.93
Iron	4,637	.55	.09	1.19	.19	Tuscola	33,147	62.73	12.42	18.92	3.75
Isabella	19,631	17.82	3.82	9.08	1.95	Van Buren	30,757	26.91	6.45	8.75	2.10
Jackson	45,779	62.09	16.09	13.56	3.51	Washtenaw	42,752	36.74	8.73	8.59	2.04
Kalamazoo	39,996	67.00	11.64	16.75	2.91	Wayne	263,639	1,049.18	275.82	39.79	10.46
Kalkaska	5,289	6.00	1.55	11.34	2.93	Wexford	12,455	10.27	2.27	8.23	1.82
Kent	111,820	252.73	55.73	22.60	4.98						

NOTE.—Luce and Gogebic counties were organized by an act of the Legislature in 1887 and Dickinson in 1891. Manitou ceased its corporate existence in 1895, being divided by an act of the Legislature, between Leelanau and Emmet counties. Accordingly the averages and data here presented for those counties are not for the full eleven years.

TABLE 3.—Exhibiting the annual average population, the annual average numbers of cases of sickness and deaths reported from **Scarlet Fever** and the annual average reported numbers of cases and deaths per 10,000 persons living in each county in Michigan, during the eleven years, 1886-96. (Compiled from reports of health officers, clerks, etc.)

State and Counties.	Annual average population of Michigan for 1886-96.	Annual average number of reported		Annual average number per 10,000 population, of reported		Counties.	Annual average population of Michigan, for 1886-96.	Annual average number of reported		Annual average number per 10,000 population, of reported	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State	2,128,008	4,383	247	20.60	1.16	Keweenaw	3,114	18.09	1.00	58.09	3.21
Alcona	5,204	7.91	.55	15.19	1.06	Lake	6,372	21.09	2.35	33.10	3.69
Alger	1,223	6.64	.18	54.29	1.47	Lapeer	29,099	70.82	1.73	24.34	.59
Allegan	39,025	63.36	2.09	16.24	.54	Leelanaw	8,544	4.18	.36	4.89	.42
Alpena	16,161	30.73	3.27	19.01	2.02	Lenawee	48,665	103.27	2.55	21.22	.52
Antrim	11,123	12.27	.64	11.03	.58	Livingston	20,765	44.45	1.00	21.41	.48
Arenac	6,033	4.09	.27	6.78	.45	Luce	2,295	1.45	.18	6.32	.79
Baraga	3,607	1.09	0	3.02	0	Mackinac	7,144	11.27	2.18	15.78	3.05
Barry	23,791	24.45	1.55	10.28	.65	Macomb	32,009	62.91	2.64	19.65	.83
Bay	57,960	76.91	5.36	13.27	.92	Manistee	24,470	28.55	2.73	11.67	1.12
Benzie	6,457	12.27	.64	19.00	.99	Manitou	939	0	0	0	0
Berrien	42,830	66.09	2.73	15.43	.64	Marquette	36,472	115.18	4.45	31.58	12.20
Branch	26,444	49.54	1.45	18.59	.54	Mason	16,877	14.64	1.18	8.68	.70
Calhoun	45,106	68.27	1.18	15.14	.26	Mecosta	20,326	42.64	2.73	20.98	1.34
Cass	21,097	26.27	.82	12.45	.39	Menominee	26,394	33.00	2.55	12.50	.97
Charlevoix	10,250	30.54	.64	29.80	.62	Midland	11,594	15.64	.18	13.49	.16
Cheboygan	12,590	12.73	1.36	10.11	1.03	Missaukee	5,707	4.64	.64	8.13	1.12
Chippewa	12,996	30.82	3.18	23.71	2.45	Monroe	32,894	36.82	1.09	11.19	.33
Clare	7,453	9.00	.64	12.08	.86	Montcalm	33,775	64.64	3.73	19.14	1.10
Clinton	26,486	49.73	1.82	18.78	6.87	Montmorency	1,844	9.45	.36	51.25	1.95
Crawford	2,755	5.09	.82	18.47	2.98	Muskegon	38,357	82.27	3.00	21.45	.78
Delta	16,398	8.00	.55	4.88	.35	Newaygo	19,607	25.55	1.73	13.03	.88
Dickinson	14,607	19.26	1.27	13.25	.86	Oakland	41,906	79.82	2.73	19.05	.65
Eaton	32,300	64.27	2.64	19.90	.82	Oceana	15,949	25.91	1.18	16.25	.74
Emmet	9,513	10.45	.55	10.91	.58	Ogemaw	5,314	24.45	.18	46.01	.34
Genesee	39,867	127.27	2.91	31.92	.73	Ontonagon	5,479	3.91	.09	7.14	.16
Gladwin	4,134	4.09	.45	9.89	1.09	Osceola	15,415	26.82	1.91	17.40	1.24
Gogebic	12,704	31.82	3.91	25.05	3.08	Oscoda	1,777	.55	.27	3.10	1.52
Gr'd Traverse	15,149	12.45	.64	8.22	.42	Otsego	4,466	15.27	1.55	34.19	3.47
Gratiot	28,171	30.00	1.45	10.65	.51	Ottawa	37,267	47.82	1.64	12.83	.44
Hillsdale	30,630	50.00	2.18	17.96	.71	Presque Isle	5,177	3.45	0	6.66	0
Houghton	38,173	185.45	12.45	45.58	3.26	Roscommon	1,938	5.00	.09	25.50	.46
Huron	29,707	43.18	2.45	14.54	.82	Saginaw	80,926	98.36	4.91	12.15	.61
Ingham	38,218	57.09	3.91	14.94	1.02	Sanilac	32,781	32.18	2.27	9.82	.69
Ionia	33,728	77.64	1.18	23.00	.35	Schoolcraft	6,042	5.91	.27	9.78	.45
Iosco	13,147	11.09	1.00	8.44	.77	Shiawassee	31,424	82.55	2.27	26.27	.72
Iron	4,637	6.55	.82	14.12	1.77	St. Clair	52,356	113.55	4.65	21.69	.89
Isabella	19,631	33.82	.82	17.23	.42	St. Joseph	25,367	76.18	2.64	30.03	1.04
Jackson	45,779	99.00	2.91	21.63	.63	Tuscola	33,147	54.55	1.82	16.46	.55
Kalamazoo	39,996	100.91	3.82	25.23	.96	Van Buren	30,757	76.64	3.91	24.92	1.27
Kalkaska	5,289	13.09	.73	24.75	1.38	Washtenaw	42,752	49.09	2.64	11.48	.62
Kent	111,820	285.91	10.45	25.57	.93	Wayne	263,659	564.27	84.82	32.78	3.22
						Wexford	12,485	21.09	2.27	16.89	1.82

NOTE.—Luce Co. and Gogebic Co. were organized by an act of the Legislature in 1887, and Dickinson in 1891. Manitou Co. ceased its corporate existence in 1895, being divided between Leelanau and Emmet counties. Accordingly the averages and data here presented for those counties are not for the full eleven years.

TABLE 4.—*Exhibiting the annual average population, the annual average numbers of Cases of Sickness and Deaths reported from Typhoid Fever, and the annual average reported numbers of Cases and Deaths per 10,000 persons living in each county in Michigan, during the eight years, 1889-1896. (Compiled from reports of health officers, clerks, etc.)*

State and counties.	Annual average population of Michigan for 1889-1896.	Annual average number of reported		Annual average number per 10,000 population, of reported		Counties.	Annual average population of Michigan for 1889-1896.	Annual average number of reported		Annual average number per 10,000 population, of reported	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,185,847	3,036.13	510.13	13.89	2.33	Keweenaw.....	2,864	9.50	1.38	33.17	4.82
						Lake.....	6,128	6.25	1.25	10.20	2.04
						Lapeer.....	29,024	24.13	4.50	8.31	1.55
Alcona.....	5,386	4.50	1.63	8.35	3.03	Leelanau.....	8,922	9.13	2.38	10.23	2.67
Alger.....	1,323	.75	.13	5.67	.98	Lenawee.....	48,533	65.75	9.88	13.55	2.04
Allegan.....	39,104	28.75	6.50	7.35	1.63	Livingston.....	20,597	9.38	.75	45.54	.36
Alpena.....	16,922	5.38	1.50	3.18	.89	Luce.....	2,363	5.63	.13	23.83	.55
Antrim.....	11,700	15.88	2.63	13.57	2.25	Mackinac.....	7,386	2.25	0	3.05	0
Arenac.....	6,475	7.25	.50	11.20	.77	Macomb.....	32,179	27.88	4.38	8.65	1.36
Baraga.....	3,821	52.38	4.38	137.08	11.46	Manistee.....	25,376	18.88	4.38	7.44	1.72
Barry.....	23,735	24.88	3.13	10.48	1.32	Manitou.....	894	0	0	0	0
Bay.....	59,514	59.63	19.13	10.02	3.21	Marquette.....	37,918	249.50	22.13	61.54	5.84
Benzie.....	7,074	10.25	2.25	14.49	3.18	Mason.....	17,655	16.25	5.25	9.20	2.97
Berrien.....	44,087	46.00	12.50	10.44	2.84	Mecosta.....	20,393	25.13	4.00	12.3	1.96
Branch.....	26,428	47.88	7.75	18.12	2.93	Menominee.....	25,860	58.13	12.25	22.48	4.74
Calhoun.....	46,067	47.75	8.13	10.37	1.76	Midland.....	12,298	23.00	2.75	18.70	2.24
Cass.....	21,105	18.25	2.38	8.65	1.13	Missaukee.....	6,265	20.00	4.25	31.92	6.78
Charlevoix.....	10,539	5.50	1.50	5.22	1.42	Monroe.....	32,912	36.13	7.00	10.98	2.13
Cheboygan.....	13,200	25.75	3.63	9.51	2.75	Montcalm.....	33,692	24.13	6.13	7.16	1.82
Chippewa.....	14,082	61.38	5.13	43.59	3.64	Montmorency.....	2,098	.75	0	3.57	0
Clare.....	7,791	14.13	2.50	18.11	3.21	Muskegon.....	38,198	24.63	5.13	6.45	1.34
Clinton.....	26,360	39.50	8.50	14.99	3.22	Newaygo.....	19,559	15.85	4.38	8.10	2.24
Crawford.....	2,785	.38	.13	1.36	.47	Oakland.....	42,181	28.25	5.00	6.70	1.19
Delta.....	17,799	14.25	3.38	8.01	.19	Oceana.....	16,265	27.25	3.75	16.75	2.31
Dickinson.....	14,607	55.38	5.63	37.91	3.85	Ogemaw.....	5,579	3.25	.75	5.85	1.34
Eaton.....	32,432	27.38	3.63	8.44	1.12	Ontonagon.....	5,746	9.13	.38	15.89	.66
Emmet.....	9,950	21.25	4.38	21.36	4.40	Osceola.....	15,828	8.50	1.63	5.37	1.03
Genesee.....	40,154	27.88	4.25	6.94	1.06	Oscoda.....	1,829	3.50	1.38	19.14	7.55
Gladwin.....	4,607	10.13	1.25	21.99	2.71	Otsego.....	4,607	9.75	2.38	21.16	5.17
Gogebic.....	13,571	178.88	10.63	131.81	7.83	Ottawa.....	37,821	31.63	6.75	8.36	1.78
G'd Traverse.....	16,059	15.00	3.25	9.34	2.02	Presque Isle.....	5,477	1.25	.50	2.28	.91
Gratiot.....	28,663	32.38	4.75	11.30	1.66	Roscommon.....	1,798	3.50	.75	19.47	4.17
Hillsdale.....	30,427	18.63	3.13	6.12	1.03	Saginaw.....	81,838	53.25	11.50	6.51	1.41
Houghton.....	40,950	120.88	10.25	29.52	2.53	Sanilac.....	33,416	54.13	9.13	16.20	2.73
Huron.....	30,897	47.88	6.50	15.50	2.10	Schoolcraft.....	6,622	37.38	1.75	56.45	2.64
Ingham.....	38,937	63.38	11.88	18.28	3.05	Shiawassee.....	32,140	49.38	6.50	15.36	2.02
Ionia.....	34,121	40.88	7.25	11.98	2.12	St. Clair.....	53,448	80.50	12.63	15.06	2.36
I-o-co.....	13,235	12.00	2.63	9.07	1.99	St. Joseph.....	23,199	22.00	4.13	8.73	1.64
Iron.....	5,019	13.38	2.75	26.66	5.48	Tuscola.....	33,720	34.38	6.38	10.20	1.89
Isabella.....	20,469	24.50	3.75	11.97	1.83	Van Buren.....	30,877	36.75	6.00	11.90	1.94
Jackson.....	48,022	50.75	9.75	11.03	2.12	Washtenaw.....	43,052	14.38	2.88	3.34	.67
Kalamazoo.....	41,016	70.75	10.13	17.25	2.47	Wayne.....	278,891	188.25	66.25	6.75	2.38
Kalkaska.....	5,461	7.63	1.13	13.97	2.07	Wexford.....	13,079	17.25	4.00	13.19	3.06
Kent.....	117,280	280.88	49.38	23.95	4.21						

NOTE—Dickinson county was organized by an act of the Legislature in 1891. Manistee ceased its corporate existence in 1895, being divided between Leelanau and Emmet counties. Accordingly the averages and data here presented for those counties are not for the full eight years.

TABLE 5.—*Exhibiting the annual average population, the average annual numbers of cases of sickness and deaths reported from Measles, and the annual average reported numbers of cases and deaths per 10,000 persons living in each county in Michigan, during the eight years, 1889-96. (Compiled from reports of health officers, clerks, etc.)*

Counties.	Annual average population of Michigan, 1889-96.	Annual average number of reported		Annual average number per 10,000 population, of reported		Counties.	Annual average population of Michigan, 1889-96.	Annual average number of reported		Annual average number per 10,000 population, of reported	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,185,847	8,488.75	92.25	38.84	.42	Keweenaw....	2,864	34.75	.50	12.13	1.75
Alcona.....	5,386	6.13	.13	11.38	.24	Lake.....	6,128	34.13	.00	55.70	.00
Alger.....	1,923	2.50	.00	18.89	.00	Lapeer.....	29,024	124.38	.00	42.85	.00
Alegan.....	39,104	221.25	2.50	56.58	.64	Leelanau.....	8,922	8.13	.00	9.11	.00
Alpena.....	16,922	98.38	1.63	58.14	.90	Lenawee.....	48,533	272.13	1.88	56.07	.39
Antrim.....	11,700	46.00	.38	39.32	.32	Livingston....	20,597	79.63	.38	38.66	.18
Arenac.....	6,475	6.25	.13	9.65	.20	Luce.....	2,363	8.50	.25	35.97	1.06
Baraga.....	3,821	10.50	.38	27.48	.94	Mackinac.....	7,386	23.75	.00	32.16	.00
Benzie.....	7,074	91.00	.38	38.34	.16	Macomb.....	32,179	98.13	.38	30.50	.12
Berrien.....	23,735	91.00	.38	38.34	.16	Manistee.....	25,376	111.38	.13	43.89	.05
Branch.....	59,514	362.00	9.50	60.83	1.60	Manitou.....	894	.00	.00	.00	.00
Calhoun.....	4,067	72.88	.75	102.32	1.06	Marquette....	37,918	246.50	5.13	65.01	1.35
Cass.....	7,074	148.50	2.75	33.70	.62	Mason.....	17,655	71.50	1.00	15.58	.57
Charlevoix...	26,428	123.13	1.00	46.59	.38	McCosta.....	20,339	27.00	.63	34.82	.31
Chippewa....	64,067	165.00	1.63	35.82	.35	Menominee....	25,860	72.75	1.88	28.13	.73
Clare.....	21,105	56.38	.13	26.71	.06	Midland.....	12,298	37.75	.50	30.70	.41
Clinton.....	10,539	41.25	.38	39.14	.18	Missaukee....	6,265	20.25	.75	32.32	1.20
Crawford....	13,200	29.00	.25	21.97	.19	Monroe.....	32,912	102.63	2.25	31.18	.68
Cyren.....	14,082	27.63	.38	19.62	.27	Montcalm....	33,692	112.13	1.75	33.28	.52
Delta.....	7,791	39.88	.13	51.19	.17	Montmorency..	2,098	5.25	.00	25.02	.00
Dickinson....	26,360	224.75	1.75	85.26	.66	Muskegon.....	38,198	219.75	1.13	57.53	.30
Eaton.....	2,785	13.50	.00	48.47	.00	Newaygo.....	19,556	67.38	.75	34.45	.38
Emmet.....	17,799	28.75	2.88	16.15	1.62	Oakland.....	42,181	166.88	.63	39.56	.13
Genesee.....	14,607	69.13	.13	47.33	.09	Oceana.....	16,265	161.38	1.00	19.22	.61
Gladwin.....	32,432	133.13	.88	41.05	.27	Ogemaw.....	5,579	4.38	.00	7.85	.00
Gogebie.....	9,950	5.88	.00	5.91	.00	Ontonagon....	5,746	28.25	.13	49.16	.23
Hillsdale....	40,154	187.88	2.13	46.79	.53	Osceola.....	15,828	59.00	.50	37.29	.32
Houghton....	16,059	68.38	.50	42.58	.31	Oscoda.....	1,828	1.25	.25	6.83	1.37
Huron.....	28,663	54.88	.25	19.15	.09	Otsego.....	4,607	7.50	.13	16.28	.28
Ingham.....	30,427	150.88	.38	49.59	.12	Ottawa.....	37,821	164.63	.38	43.53	.10
Ionia.....	40,950	397.88	1.25	97.16	.31	Presque Isle..	5,477	13.63	.50	24.89	.91
Iosco.....	30,897	77.25	2.00	25.00	.65	Rosecommon...	1,795	13.50	.13	75.08	.72
Iron.....	38,987	49.88	2.00	12.81	.51	Saginaw.....	81,838	188.13	2.00	22.99	.24
Isabella.....	34,121	197.38	1.00	57.85	.29	Sanilac.....	33,416	124.38	.75	37.22	.22
Jackson.....	13,235	28.63	.25	21.63	.19	Schoolcraft...	6,622	47.75	.63	72.11	.95
Kalamazoo...	5,019	36.50	.25	72.72	.50	Shiawassee....	32,140	185.00	1.00	57.56	.31
Kalkaska....	20,468	29.25	.50	14.29	.24	St. Clair.....	53,448	110.00	.38	20.58	.07
Kent.....	46,022	76.75	.88	16.68	.19	St. Joseph....	25,199	84.50	.75	33.53	.30
	41,016	351.25	1.88	55.64	.46	Tuscola.....	33,720	108.75	.38	32.25	.11
	5,461	37.13	.25	67.99	.46	Van Buren....	30,877	235.13	.50	76.15	.16
	117,280	815.63	3.63	69.55	.31	Washtenaw...	43,052	151.88	.63	35.28	.15
						Wayne.....	278,891	114.50	16.13	4.11	.58
						Wexford.....	13,079	70.38	1.00	53.81	.76

NOTE.—Dickinson county was organized by an act of the Legislature in 1891. Manitou ceased its corporate existence in 1895, being divided between Leelanau and Emmet counties. Accordingly the averages and data here presented for those counties are not for the full eight years.

TABLE 6.—*Exhibiting the total numbers of outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever and Measles reported to the Michigan State Board of Health during certain specified periods, of which reporters gave the dates of beginning; also the numbers of those outbreaks which began in each month.*

Disease.	Periods of Years	Totals	Jan.	Feb	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Diphtheria	8 yrs., 1889-'96 ..	3,492	539	254	247	231	274	188	188	232	255	342	366	376
Scarlet Fever.....	7 yrs., '89, '91-6..	3,712	714	331	303	296	286	215	187	193	217	292	321	357
Typhoid Fever	8 yrs., 1889-'96..	3,830	257	115	98	125	132	226	344	711	706	632	295	189
Measles	8 yrs., 1889-'96..	2,225	235	205	257	338	314	272	141	54	46	71	109	183

Seasonal Spreading of Diphtheria.

From table 6, it appears that of the 3,492 outbreaks of diphtheria reported to this office during the eight years 1889-96, the greatest number (539) began in the month of January, and the least number (188) in June and July.

Starting from July, the month of minimum incidence, the number of new outbreaks of the disease steadily increases until it reaches the maximum in January, when it begins to decline.

According to the data contained in this table (6), in Michigan the season of greatest danger of diphtheria spreading to new localities is during the months of October to March, i. e., during the season of lowest atmospheric temperature, and comparison of table 6 with temperature tables on pages 4 and 5 of this report shows that the fluctuations in the spread of diphtheria correspond generally with those of atmospheric temperature, the former being in inverse proportion to the latter.

Exhibit XIII., (page 128 of this Report) constructed on a different statistical basis, shows the months of greatest prevalence of diphtheria.

Seasonal Spreading of Scarlet Fever.

Table 6 shows that the seasonal variations in incidence of scarlet fever in Michigan are very similar to those of diphtheria, its maximum spread occurring in January and its minimum spread in July. This indicates that scarlet fever like diphtheria is a "cold weather disease" whose fluctuations in spread generally follow (inversely) those of atmospheric temperature. The "Sickness Statistics" (Exhibit XIII., page 128 of this Report) show slightly different fluctuations of prevalence of scarlet fever from those shown in table 6; but are *generally* similar.

Seasonal Spreading of Typhoid Fever.

According to table 6 the season of greatest spreading of typhoid fever in Michigan is from August to October, and its minimum spread occurs in February to May. These seasons of greatest and least incidence of typhoid fever very closely accord with those of its greatest and least prevalence, shown by the "Statistical Study of Sickness" (Exhibit XX., page 139 of this Report) and indicate that, unlike diphtheria and scarlet fever, the fluctuations in the spread of typhoid fever have no direct rela-

tion to those of atmospheric temperature. But comparison of table 6 with table 16 on page 336 of this Report, shows that there exist very close relations between the fluctuations of incidence of typhoid fever and the amount of ground water in wells; the spread of typhoid fever increasing in proportion to the decrease of the ground water.

Seasonal Spreading of Measles.

From table 6 it appears that the season of greatest spreading of measles in Michigan, begins in March, reaching its maximum in April and extending through May and June, gradually declining until it reaches its minimum in August and September.

Prevalence by periods of years.

TABLE 7.—*A comparison of the deaths from scarlet fever and small-pox reported to the Secretary of State as having occurred in Michigan during the five years (1869-1873) preceding the organization of the State Board of Health with the seventeen years, the twenty-one years and the twenty-three years, immediately succeeding its organization. Also a comparison of the reported deaths from typhoid fever during the ten years immediately before the restriction of that disease was undertaken by the State Board of Health, with the deaths which occurred in the twelve years and the sixteen years and eighteen years after the restriction began.*

Disease.	Periods of Time Compared.	Estimated Average Population.	Average Deaths Reported per year.	Total Reported Deaths.	Average Reported Deaths per Year per 10,000 inhabitants.	Decrease of Deaths per Year per 10,000 inhabitants.	Average Decrease of Reported Deaths per year.	Lives Probably Saved, according to the Reports.
Scarlet Fever...	5 years, 1869-73.....	1,215,220	5.9	2,945	4.85	-----	-----	-----
	17 years, 1874-90.....	*1,732,394	3.4	6,526	2.24	2.61	425	7,684
	21 years, 1874-94.....	1,818,840	376	7,591	2.07	2.78	506	10,626
	23 years, 1874-96.....	1,860,423	353	8,113	1.90	2.95	549	12,623
Small-pox.....	5 years, 1869-73.....	1,215,220	103	516	.85	-----	-----	-----
	17 years, 1874-90.....	1,731,394	27	449	.16	.69	120	2,040
	21 years, 1874-94.....	1,818,840	26	539	.15	.70	127	2,667
	23 years, 1874-96.....	1,860,423	27	623	.15	.70	130	2,995
Typhoid Fever...	10 years, 1869-78.....	*1,325,110	491	4,912	3.77	-----	-----	-----
	12 years, 1879-90.....	1,828,604	550	6,605	3.01	.76	139	1,668
	16 years, 1879-91.....	1,938,790	571	9,140	2.95	.82	159	2,544
	18 years, 1879-96.....	1,978,596	574	10,339	2.90	.87	172	3,093
Scarlet Fever... Small-pox..... Typhoid Fever..	Long period of years, (18 and 23.)	-----	-----	-----	-----	-----	851	18,716

* This average was obtained by the arithmetical method of estimating the population in the intercensal years, using the State and National censuses. Apparently it differs slightly from the average used, some years ago, in computing "Average Reported Deaths per 10,000 inhabitants," shown in diagrams heretofore published and used in the sixth column of this table.

**LIVES SAVED BY PUBLIC-HEALTH WORK.
COMPARISON OF DEATH-RATES IN MICHIGAN
FROM SCARLET FEVER AND SMALL-POX
BEFORE AND SINCE THE STATE BOARD OF
HEALTH WAS ESTABLISHED, AND FROM TY-
PHOID FEVER BEFORE AND SINCE ITS RE-
STRICTION WAS UNDERTAKEN BY THE STATE
BOARD. (COMPILED FROM THE STATE DEPART-
MENT'S "VITAL STATISTICS" OF MICHIGAN.)**

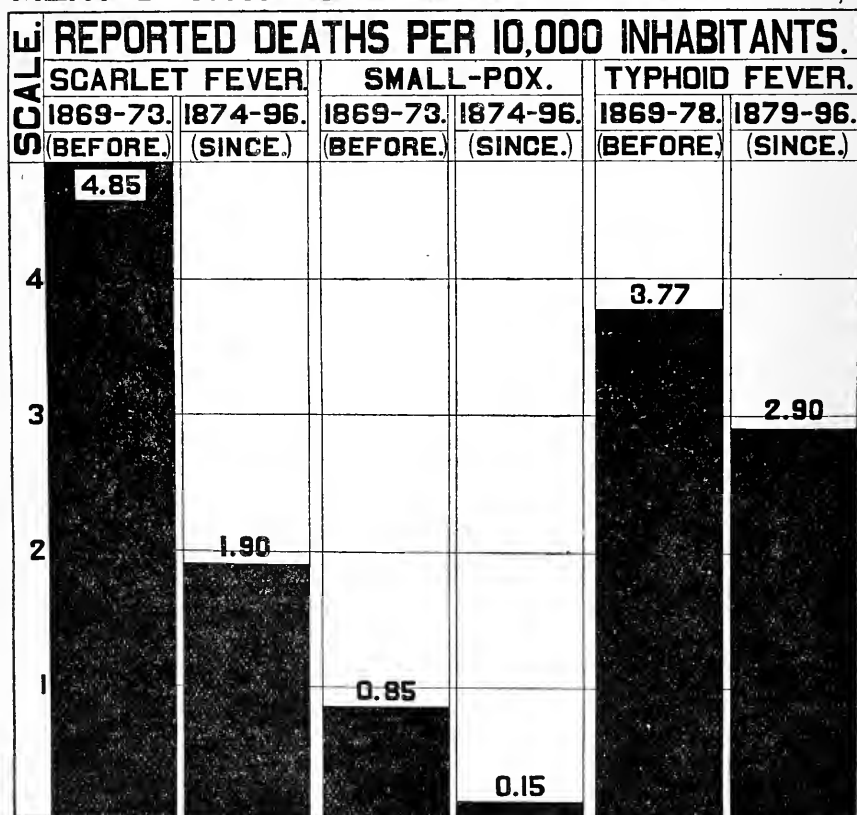


TABLE 8.—*Exhibiting, for Michigan, the average annual population, the total number of reported deaths, and the average annual number of deaths per 10,000 population, for periods of years before restrictive measures were recommended and undertaken in the several diseases named, compared with similar data for periods of years since those measures were begun, and with similar data for both periods. Also the ratios of deaths to cases, as compiled from reports to the Secretary of the State Board of Health, and the estimated average annual numbers of cases, per 10,000 population.*

Diseases.	Periods of time.	Average annual population.	Total reported deaths.*	Deaths per 10,000 population.	Ratio of deaths to cases.	Estimated cases per 10,000 population.
Consumption	22 yrs., 1869-'90.	1,615,117	39,034	10.99	4 years,	14.84
	6 yrs., 1891-'96.	2,223,172	12,989	9.74	1893-'96,	13.15
	28 yrs., 1869-'96.	1,745,414	52,023	10.65	1 to 1.35	14.38
Diphtheria	12 yrs., 1869-'80.	1,373,355	6,008	3.64	13 years,	16.16
	16 yrs., 1881-'96.	2,024,459	16,419	5.07	1884-'96,	22.51
	28 yrs., 1869-'96.	1,745,414	22,427	4.59	1 to 4.44	20.38
Typhoid Fever.....	17 yrs., 1869-'85.	1,497,853	8,508	3.34	13 years,	19.31
	11 yrs., 1886-'96.	2,128,008	6,742	2.88	1884-'96,	16.65
	28 yrs., 1869-'96.	1,745,414	15,250	3.12	1 to 5.78	18.03
Scarlet Fever.....	8 yrs., 1869-'76.	1,279,427	4,207	4.11	13 years,	70.16
	20 yrs., 1877-'96.	1,931,509	6,851	1.78	1884-'96,	30.38
	28 yrs., 1869-'96.	1,745,414	11,058	2.26	1 to 17.07	38.58
Measles	21 yrs., 1869-'89.	1,592,318	3,141	.94	7 years,	86.48
	7 yrs., 1890-'96.	2,204,703	902	.58	1890-'96,	53.36
	28 yrs., 1869-'96.	1,745,414	4,043	.83	1 to 92.00	76.36
Whooping-cough	27 yrs., 1869-'95.	1,724,299	3,944	.85	10 years,	34.20
	1 year, 1896	2,315,517	158	.68	1887-'96,	27.36
	28 yrs., 1869-'96.	1,745,414	4,102	.84	1 to 40.23	33.79
Small-pox	8 yrs., 1869-'76.	1,279,427	640	.63	13 years,	2.89
	20 yrs., 1877-'96.	1,931,509	503	.13	1884-'96,	.60
	28 yrs., 1869-'96.	1,745,414	1,143	.23	1 to 4.59	1.06

* Data from the Vital Statistics of Michigan.

The "Ratio of deaths to cases" is obtained for each disease for as long a time as is possible from reports in the Office of the Secretary of the State Board of Health, and in years where cases of sickness were not reported, the computations of cases per 10,000 population are based on the presumption, that the ratio of deaths to cases has been the same for the years when the cases were not reported to the Secretary of the State Board of Health as when they were reported.

Table 8 shows that, with the exception of diphtheria (explained later), the average annual deaths per 10,000 population in the several periods of years, for the diseases named are less, and from scarlet fever and from small-pox very much less, since the vigorous prosecution of restrictive measures was inaugurated by the State Board of Health, than they were before such measures were taught and practised; and therefore lower than the annual averages for both periods.

Diphtheria, comparatively a newly-recognized disease.

Previous to Bretonneau's first work in 1821, on diphtheria and membranous croup, very little was definitely known concerning the nature of diphtheria. Ancient history states that an Indian physician at the time of Pythagoras describes a disease suggestive of diphtheria. The descriptions of epidemics in Spain in 1583, in Germany in 1718, in Switzerland in 1752, in Netherlands in 1747, in Sweden in 1755, suggest that they might have been diphtheria epidemics. The Report of the Registrar General in England for the year 1895 exhibits tables which show that deaths from scarlet fever and from diphtheria, from 1838 to 1855, were reported together; these two diseases not having been differentiated until 1855. In New York city deaths from diphtheria were first reported in 1857. In Brooklyn, N. Y., diphtheria deaths were first reported in 1859. Massachusetts' Reports show that deaths from diphtheria were reported as far back as 1858.

In 1883 Klebs first recognized a bacillus as the cause of diphtheria, and in 1884, Löffler cultivated and described the germ, which has since been known as the Klebs-Löffler bacillus.

On page 158, of the Annual Report of the Michigan State Board of Health for the year 1894, is a diagram, exhibiting the number of deaths from diphtheria per 100,000 population for each of the 26 years, 1868-93, and from that diagram it will be seen that up to the year 1876, when the epidemic rise in diphtheria began, that the death-rate was very low,—an average of less than 12 deaths per 100,000 population. From the reports relative to the other diseases and especially in regard to those of scarlet fever, it may be reasonably inferred that diphtheritic cases may not always have been clearly diagnosed. Diphtheria was epidemic in many different parts of the country about this time; being epidemic in Massachusetts in 1876 and '77, in Brooklyn in 1880 and '81, in Ohio in 1880 and in Michigan, reaching its maximum in 1881. In Michigan there were 26 per cent more deaths from that disease during that year than for any other, and 60 per cent more than were reported for the epidemic year of 1890. In 1878, when diphtheria was on its epidemic rise, the Michigan State Board of Health began the publication of a leaflet for the restriction of this disease. From the same diagram it can be seen that there was a check in this disease from 1879 to 1880. How much the work of this Board checked the probable rise in the death-rate of this disease, is impossible to estimate. In 1881 the State Board extended its efforts to reduce the sickness and mortality from diphtheria, by widely circulating its publication on the restriction and prevention of that disease. Since this work has been thoroughly established, there has been a decrease in the mortality from diphtheria.

Three years before the germ was recognized by Klebs. Feb. 17, 1880, at a Sanitary Convention held in Grand Rapids, Secretary Baker of the Michigan State Board of Health probably expressed the sum total of the knowledge of the virulence of diphtheria known at this time when he said:—

"Its *special poison* is believed to enter the body by way of the mouth and air passages, and to be communicated by whatever comes in contact with the exhalations and excretions from the body of the sick person." The germ had not then been discovered, and it was not then known that it is usually confined to the throat, mouth and nose. But, clinically, diphtheria was known to be a communicable disease.

TABLE 9.—*Exhibiting the numbers of outbreaks and cases of and deaths from Diphtheria which occurred in the cities, villages, and townships of Michigan for each of and averages for the 7 years, 1890-6, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Year.	Classes of political divisions and numbers of each class of divisions.	Population.	Health jurisdictions.	Outbreaks in			Cases.	Deaths.	Fatality. Per cent, deaths of cases.	Rates per 10,000 Population.			
				Localities.		No. of				Cases.	Deaths.	Cases.	Deaths.
				No. of	Per cent of all localities.								
1890	State (84 counties)	2,093,889	1,527	365	24	442	4,206	1,050	25	20.09	5.01		
	Cities (61)	709,657	62	37	60	55	2,451	673	27	34.54	9.48		
	Villages (269)	248,647	269	64	24	85	285	67	24	11.46	2.69		
	Townships (1,196)	1,135,585	1,196	264	22	302	1,470	310	21	12.94	2.73		
1891.	State (85 counties)	2,130,827	1,554	459	30	535	4,385	1,002	23	20.58	4.70		
	Cities (67)	747,533	68	53	78	75	2,430	508	24	28.49	6.80		
	Villages (278)	242,824	278	84	30	93	298	76	26	12.27	3.13		
	Townships (1,203)	1,140,470	1,208	322	27	367	1,957	418	21	17.16	3.58		
1892.	State (85 counties)	2,167,765	1,550	463	30	527	4,818	1,099	23	22.23	5.07		
	Cities (67)	769,222	68	52	76	66	2,731	635	23	35.50	8.26		
	Villages (279)	247,391	279	86	31	96	434	101	23	17.54	4.08		
	Townships (1,203)	1,151,152	1,203	325	27	365	1,653	363	22	14.36	3.15		
1893.	State (85 counties)	2,204,703	1,560	460	29	546	4,736	1,092	23	21.48	4.95		
	Cities (69)	798,853	70	48	67	59	2,645	553	23	33.11	6.92		
	Villages (283)	251,458	283	77	27	100	504	109	22	20.04	4.33		
	Townships (1,207)	1,154,392	1,207	335	28	387	1,587	430	27	13.75	3.72		
1894	State (85 counties)	2,241,641	1,575	367	23	435	3,852	744	19	17.18	3.32		
	Cities (69)	821,051	70	49	70	71	2,101	438	21	25.59	5.33		
	Villages (293)	256,036	293	66	23	75	351	59	17	13.71	2.30		
	Townships (1,212)	1,164,554	1,212	252	21	289	1,400	247	18	12.02	2.12		
1895.	State (83 counties)	2,278,579	1,586	347	22	401	3,433	708	21	15.07	3.11		
	Cities (76)	862,662	77	47	61	65	1,876	431	24	21.75	5.00		
	Villages (292)	242,799	292	58	20	61	302	50	17	12.44	2.05		
	Townships (1,217)	1,173,118	1,217	242	20	275	1,255	227	18	10.70	1.94		
1896.	State (83 counties)	2,315,517	1,588	331	21	423	4,013	757	19	17.33	3.27		
	Cities (76)	885,388	77	46	60	74	2,043	406	20	23.07	4.59		
	Villages (295)	246,869	295	60	21	65	270	51	19	10.94	2.07		
	Townships (1,216)	1,183,260	1,216	225	19	284	1,700	300	18	14.37	2.54		
Averages, 7 yrs. 1890-6.	State	2,204,703	1,562	399	26	473	4,206	922	22	19.05	4.18		
	Cities	799,195	70	47	67	66	2,282	521	23	28.76	6.51		
	Villages	248,003	284	71	25	82	349	73	21	14.08	2.97		
	Townships	1,157,504	1,208	281	23	324	1,575	328	21	13.60	2.83		

NOTE.—The prevalence of diphtheria was reported in 72 counties in 1890; 70 in '91; 76 in '92; 72 in '93; 71 in '94; 71 in '95, and 67 in '96.

Comparative prevalence of Communicable Diseases in Urban and Rural Districts.

Tables 9, 10, 11, 12, 13, and 14 present for the diseases named, for each of the years and periods of years specified, data relative to the prevalence of sickness in the State from communicable diseases, in cities, villages

and townships, each independently of the others. These tables facilitate study and comparison of the prevalence of sickness in the rural districts with that of centres of population.

The tables show that for diphtheria, typhoid fever, and consumption the cases and deaths per 10,000 population are greatest in cities; for scarlet fever, measles and whooping-cough the cases per 10,000 population are greatest in villages, and the deaths per 10,000 population are greatest in cities. The proportion of all localities infected, and the fatality, were, for all diseases, greatest in cities.

TABLE 10.—*Exhibiting the numbers of outbreaks and cases of and deaths from Scarlet Fever which occurred in the cities, villages, and townships of Michigan for each of and averages for the 6 years, 1891-6, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Year.	Classes of political divisions and numbers of each class of divisions.	Population.	Health jurisdiction.	Outbreaks in			Cases.	Deaths.	Fatality. Per cent, deaths of cases.	Rates per 10,000 Population.	
				Localities.						Cases.	Deaths.
				No. of	Per cent of all localities.	No. of					
1891.	State (85 counties).....	2,130,827	1,554	516	33	605	6,212	286	5	29.15	1.34
	Cities (67).....	747,533	68	50	74	62	2,475	122	5	33.11	1.63
	Villages (278).....	242,824	278	110	40	132	904	40	4	37.23	1.65
	Townships (1,208).....	1,140,470	1,205	356	29	411	2,833	124	4	24.84	1.09
1892.	State (85 counties).....	2,167,765	1,550	548	30	625	7,075	488	7	32.64	2.25
	Cities (67).....	769,222	68	56	82	66	3,233	264	8	42.03	3.43
	Villages (279).....	247,391	279	115	41	134	1,012	58	6	40.91	2.34
	Townships (1,203).....	1,151,152	1,203	377	31	425	2,830	166	6	24.58	1.44
1893.	State (85 counties).....	2,204,703	1,560	566	36	675	6,065	415	7	27.51	1.88
	Cities (69).....	798,853	70	56	78	70	2,791	219	8	35.01	2.74
	Villages (283).....	251,458	283	114	39	142	740	52	7	29.43	2.07
	Townships (1,207).....	1,154,392	1,207	396	32	463	2,528	144	6	21.90	1.25
1894.	State (85 counties).....	2,241,641	1,575	546	34	678	5,500	203	4	24.54	.91
	Cities (69).....	821,051	70	54	75	70	2,262	75	3	27.55	.91
	Villages (293).....	256,036	293	109	37	140	702	26	4	27.42	1.02
	Townships (1,212).....	1,164,554	1,212	383	31	468	2,536	102	4	21.78	.88
1895.	State (83 counties).....	2,278,579	1,586	462	29	574	3,908	125	3	17.15	.55
	Cities (76).....	862,662	77	60	77	84	1,424	39	3	16.51	.45
	Villages (292).....	242,799	292	85	29	108	548	9	2	22.57	.37
	Townships (1,217).....	1,173,118	1,217	317	26	382	1,936	77	4	16.50	.66
1896.	State (83 counties).....	2,315,517	1,588	332	21	406	2,646	81	3	11.43	.35
	Cities (76).....	855,388	77	55	71	82	1,475	57	4	16.66	.64
	Villages (295).....	246,869	295	60	20	72	300	2	1	12.15	.08
	Townships (1,216).....	1,183,260	1,216	217	18	292	871	22	3	7.36	.19
Averages, 6 yrs. 1891-6.	State.....	2,223,172	1,569	495	32	594	5,234	266	5	23.54	1.20
	Cities.....	814,118	7	55	75	72	2,278	129	6	27.98	1.59
	Villages.....	247,896	287	99	35	121	701	31	4	28.28	1.26
	Townships.....	1,161,158	1,211	341	28	400	2,256	106	5	19.43	.91

NOTE.—The presence of scarlet fever was reported in 72 counties in 1891, 76 in '92, 74 in '93, 77 in '94, 71 in '95, and 64 in '96.

TABLE 11.—*Exhibiting the numbers of outbreaks and cases of and deaths from Typhoid Fever which occurred in the cities, villages, and townships of Michigan for each of and averages for the 7 years, 1890-6, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages, and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Year.	Classes of Political Divisions and Numbers of each class of Divisions.	Population.	Health Jurisdictions.	Outbreaks in			Cases.	Deaths.	Fatality, Per cent, Deaths of cases.	Rates per 10,000 Population.			
				Localities.		No. of				Cases.	Deaths.	Cases.	Deaths.
				No. of	Per cent of all localities.								
1890.	State (84 counties)	2,093,889	1,527	310	20	330	1,924	304	16	9.19	1.45		
	Cities (61)	709,657	62	31	55	40	962	138	14	13.56	1.95		
	Villages (269)	248,647	269	67	25	72	296	43	15	11.90	1.73		
	Townships (1,196)	1,135,585	1,196	209	17	218	666	123	18	5.86	1.08		
1891.	State (85 Counties)	2,130,827	1,554	498	32	543	4,670	707	15	21.92	3.32		
	Cities (67)	747,533	68	48	71	57	2,092	295	14	27.99	3.95		
	Villages (278)	242,824	278	84	30	95	734	99	13	30.23	4.08		
	Townships (1,208)	1,140,470	1,208	366	30	392	1,844	313	17	16.17	2.74		
1892.	State (85 counties)	2,167,765	1,550	484	31	527	2,582	538	21	11.91	2.48		
	Cities (67)	769,222	68	48	71	57	1,161	266	23	15.09	3.46		
	Villages (279)	247,391	279	89	32	103	312	47	15	12.61	1.90		
	Townships (1,203)	1,151,152	1,203	347	29	367	1,109	225	20	9.63	1.95		
1893.	State (85 counties)	2,204,703	1,560	504	32	545	3,512	594	17	15.93	2.69		
	Cities (69)	798,853	70	52	74	61	2,082	365	18	26.06	4.57		
	Villages (283)	251,458	283	99	35	106	391	48	12	15.55	1.99		
	Townships (1,207)	1,154,392	1,207	353	29	378	1,039	151	17	9.00	1.57		
1894.	State (85 counties)	2,241,641	1,575	529	34	600	2,805	506	18	12.51	2.26		
	Cities (69)	821,031	70	58	83	81	1,020	229	22	12.42	2.78		
	Villages (293)	256,036	293	91	31	105	392	53	14	15.31	2.07		
	Townships (1,212)	1,164,554	1,212	380	31	414	1,393	224	16	11.96	1.92		
1895.	State (83 counties)	2,278,579	1,586	693	44	800	3,751	621	17	16.46	2.73		
	Cities (76)	862,662	77	64	83	97	1,282	258	20	14.86	2.99		
	Villages (292)	242,799	292	122	42	138	494	61	12	20.35	2.51		
	Townships (1,217)	1,173,118	1,217	507	42	565	1,975	302	15	10.83	2.57		
1896.	State (83 counties)	2,315,517	1,588	545	35	643	2,496	405	16	10.78	1.75		
	Cities (76)	885,388	77	58	74	89	1,079	193	18	12.19	2.18		
	Villages (295)	246,869	295	114	39	137	311	46	15	12.60	1.86		
	Townships (1,216)	1,183,260	1,216	373	31	417	1,106	166	15	9.35	1.40		
Averages, 7 yrs., 1890-96.	State	2,204,703	1,562	509	33	570	3,106	525	17	14.09	2.38		
	Cities	799,193	70	52	74	69	1,383	249	18	17.30	3.12		
	Villages	248,003	284	95	33	108	419	57	14	16.88	2.29		
	Townships	1,157,504	1,208	362	30	393	1,305	219	17	11.27	1.89		

NOTE.—The presence of typhoid fever was reported in 68 counties in 1890, 74 in '91, 72 in '92, 76 in '93, 75 in '94, 82 in '95, and 80 in '96.

TABLE 12.—*Exhibiting the numbers of outbreaks and cases of and deaths from Measles which occurred in the cities, villages and townships of Michigan for each of and averages for the 7 years, 1890-6, and the comparative numbers of outbreaks, cases, deaths and fatality from this disease in cities, villages and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Year.	Classes of Political Divisions and Numbers of each class of Divisions.	Population.	Health jurisdictions.	Outbreaks in			Cases.	Deaths.	Fatality. Per cent, Deaths of cases.	Rates per 10,000 Population.	
				Localities.		No. of				Cases.	Deaths.
				No. of	Per cent of all localities.						
1890.	State (84 counties)	2,093,889	1,527	407	27	420	11,904	143	1	56.85	.68
	Cities (61)	709,657	62	31	50	31	2,246	58	3	31.65	.82
	Villages (269)	248,647	269	90	33	98	3,411	35	1	137.18	1.41
	Townships (1,196)	1,135,585	1,196	286	24	291	6,247	50	1	55.01	.44
1891.	State (85 counties)	2,130,827	1,554	379	24	394	12,173	149	1	57.13	.70
	Cities (67)	747,533	68	36	53	42	3,824	81	2	51.15	1.08
	Villages (278)	242,824	278	85	31	89	1,968	15	1	81.05	.62
	Townships (1,208)	1,140,470	1,208	258	21	263	6,381	53	1	55.93	.46
1892.	State (85 counties)	2,167,765	1,550	229	15	238	3,830	76	2	17.67	.35
	Cities (67)	769,222	68	34	50	33	1,097	42	4	14.26	.55
	Villages (279)	247,391	279	44	16	45	775	15	2	31.33	.61
	Townships (1,203)	1,151,132	1,203	151	13	155	1,958	19	1	17.01	.17
1893.	State (85 counties)	2,204,703	1,560	326	21	365	7,334	119	1	33.27	.54
	Cities (69)	795,853	70	41	57	56	3,124	78	2	39.11	.98
	Villages (283)	251,458	283	72	26	80	958	9	1	38.10	.36
	Townships (1,207)	1,154,392	1,207	213	18	229	3,252	32	1	28.17	.28
1894.	State (85 counties)	2,241,641	1,573	339	22	359	10,518	55	.5	46.92	.25
	Cities (69)	821,051	70	40	57	46	4,870	15	.3	59.31	.18
	Villages (293)	256,036	293	82	28	84	1,644	3	.2	64.21	.12
	Townships (1,212)	1,164,554	1,212	217	18	225	4,004	37	1 0	34.38	.32
1895.	State (83 counties)	2,278,579	1,586	238	15	268	3,870	12	.3	16.98	.05
	Cities (76)	862,662	77	43	56	55	1,524	5	.3	17.67	.06
	Villages (292)	242,799	292	51	17	51	586	2	.3	24.14	.08
	Townships (1,217)	1,173,118	1,217	144	12	162	1,760	5	.3	15.00	.04
1896.	State (83 counties)	2,315,517	1,588	366	23	405	15,409	156	1.0	66.55	.67
	Cities (76)	885,358	77	50	65	60	6,174	91	1.5	69.73	1.03
	Villages (295)	246,869	295	87	30	96	2,955	25	.8	19.70	1.01
	Townships (1,216)	1,183,260	1,216	229	19	249	6,280	40	.6	53.07	.34
Averages, 7 yrs., 1890-96.	State	2,204,703	1,562	326	21	350	9,291	101	1	42.14	.46
	Cities	799,195	70	39	56	47	3,266	53	2	40.87	.66
	Villages	248,003	287	73	26	78	1,757	15	1	70.85	.60
	Townships	1,157,504	1,205	214	18	225	4,269	34	1	36.88	.29

NOTE.—The presence of measles was reported in 74 counties in 1890, 69 in '91, 69 in '92, 71 in '93, 67 in '94, 64 in '95, and 75 in '96.

TABLE 13 — *Exhibiting the numbers of outbreaks and cases of and deaths from Consumption which occurred in the cities, villages, and townships of Michigan for each of and averages for the 4 years, 1893-6, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages, and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Averages, 4 years, 1893-96.	Year.	Classes of Political Divisions and Numbers of each class of Divisions.	Population.	Health Jurisdictions.	Outbreaks in		Cases.	Deaths.	Fatality. Per cent. Deaths of Cases.	Rates per 10,000 popula- tion.	
					Localities.					Cases.	Deaths.
					No of	Per cent of all locali- ties.					
1893.		State (85 counties).....	2,204,703	1,560	525	33	1,988	1,509	76	9.02	6.84
		Cities (69).....	798,853	70	34	47	917	756	82	11.48	9.46
		Villages (283).....	251,458	283	97	33	232	161	69	9.24	6.40
		Townships (1,207).....	1,154,392	1,207	394	32	839	592	71	7.27	5.13
1894.		State (85 counties).....	2,241,641	1,575	590	37	2,060	1,581	77	9.19	7.05
		Cities (69).....	821,051	70	48	67	926	770	83	11.28	9.38
		Villages (293).....	256,036	293	118	40	272	178	65	10.62	6.95
		Townships (1,212).....	1,164,554	1,212	424	35	862	633	73	7.40	5.44
1895.		State (83 counties).....	2,278,579	1,588	626	39	2,068	1,613	78	9.08	7.08
		Cities (76).....	862,602	77	53	68	988	853	86	11.45	9.89
		Villages (292).....	242,799	292	116	39	218	144	66	8.98	5.93
		Townships (1,217).....	1,173,118	1,217	457	38	862	616	71	7.35	5.25
1896.		State (83 counties).....	2,315,517	1,588	512	32	2,198	1,454	66	9.49	6.28
		Cities (76).....	885,388	77	54	69	1,354	861	64	15.29	9.72
		Villages (295).....	246,869	295	109	37	187	127	68	7.57	5.14
		Townships (1,216).....	1,183,260	1,216	349	29	657	466	71	5.55	3.94
Averages, 4 years, 1893-96.		State.....	2,260,110	1,578	563	36	2,079	1,539	74	9.20	6.81
		Cities.....	841,989	74	47	64	1,046	810	77	12.43	9.60
		Villages.....	249,291	291	110	38	227	153	67	9.11	6.12
		Townships.....	1,168,831	1,213	406	33	805	577	72	6.89	4.93

NOTE.—The presence of consumption was reported in 78 counties in 1893, 78 in '94, 80 in '95, and 79 in '96.

TABLE 14.—*Exhibiting the numbers of outbreaks and cases of and deaths from Whooping-Cough which occurred in the cities, villages, and townships of Michigan for each of and averages for the 6 years, 1891-6, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages, and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Year.	Classes of political divisions and numbers of each class of divisions.	Population.	Health jurisdiction.	Outbreaks in			Cases.	Deaths.	Fatality. Per cent, deaths of cases.	Rates per 10,000 Population.			
				Localities		No. of				Cases.	Deaths.	Cases.	Deaths.
				No. of	Per cent of all localities.								
1891.	State (85 counties).....	2,130,827	1,554	162	10	162	2,486	101	4	11.67	.47		
	Cities (67).....	747,533	68	15	22	15	842	38	5	11.26	.51		
	Villages (278).....	242,824	278	30	11	30	390	20	5	16.06	.82		
	Townships (1,208).....	1,140,470	1,208	117	10	117	1,254	43	3	11.00	.38		
1892.	State (85 counties).....	2,167,765	1,550	191	12	191	3,188	77	2	14.71	.36		
	Cities (67).....	769,222	68	15	22	15	835	39	12	4.36	.51		
	Villages (279).....	247,391	279	28	10	28	765	1	0.1	30.92	.04		
	Townships (1,203).....	1,151,152	1,203	148	12	148	2,088	37	2	18.14	.32		
1893.	State (85 counties).....	2,204,703	1,560	214	14	214	4,047	134	3	18.35	.61		
	Cities (69).....	798,853	70	18	25	18	689	73	11	8.62	.91		
	Villages (283).....	251,458	283	41	14	41	490	7	1	19.49	.28		
	Townships (1,207).....	1,154,392	1,207	155	13	155	2,868	54	2	24.84	.47		
1894.	State (85 counties).....	2,241,641	1,575	241	15	241	4,555	123	3	20.32	.55		
	Cities (69).....	821,051	70	21	29	21	933	33	4	11.56	.40		
	Villages (293).....	256,036	293	34	11	34	590	8	1	23.04	.31		
	Townships (1,212).....	1,164,554	1,212	186	15	186	3,032	82	3	26.04	.70		
1895.	State (83 counties).....	2,278,579	1,586	240	15	242	4,284	109	3	18.76	.48		
	Cities (76).....	862,662	77	35	43	37	1,229	45	4	14.25	.52		
	Villages (292).....	242,793	292	37	13	37	536	7	1	22.08	.29		
	Townships (1,217).....	1,173,118	1,217	168	14	168	2,519	57	2	21.47	.49		
1896.	State (83 counties).....	2,315,517	1,588	281	18	297	5,466	84	2	23.61	.36		
	Cities (76).....	885,388	77	36	46	41	1,197	27	2	13.52	.30		
	Villages (295).....	246,869	295	70	24	72	992	13	1	40.18	.53		
	Townships (1,216).....	1,183,260	1,216	175	14	184	3,277	44	1	27.69	.37		
Averages, 6 yrs. 1891-6.	State.....	2,223,172	1,569	222	14	225	4,004	105	3	18.01	.47		
	Cities.....	814,118	72	23	32	25	871	43	5	10.70	.53		
	Villages.....	247,896	287	40	14	40	627	9	1	25.29	.36		
	Townships.....	1,161,158	1,211	158	13	160	2,506	53	2	21.58	.46		

NOTE.—The presence of whooping-cough was reported in 59 counties in 1891, 65 in '92, 70 in '93, 71 in '94, 72 in '95, and 76 in '96.

REPORTED SOURCES OF CONTAGIUM OF DIPHTHERIA, SCARLET FEVER, TYPHOID FEVER AND MEASLES IN MICHIGAN.

In the Annual Reports of this Board for a number of years past, tables have been published showing for each of the four above-named diseases, the reported sources of contagium in outbreaks of those diseases. The said tables are based on reports from health officers who reported that they believed they were able, or not able, to trace the source of contagium of outbreaks of said diseases which occurred in their jurisdictions. Table

15 is a summary of such tables, and shows the reported sources of contagium of the various diseases mentioned therein, for the ten years 1887-96.

Table 15 shows that during the 10 years 1887-96, the sources of contagium were stated, for the four diseases named, relative to 118,052 cases. Seventeen per cent of this total were definitely or probably traced to former cases; 16 per cent definitely and 1 per cent probably. Two per cent were definitely or probably traced to outside jurisdictions; nearly all were definitely traced. Seven per cent were traced to the infections from the various sources. Relative to thirty-seven per cent the sources of contagium were reported as unknown or originating from sources too indefinite for classification. In thirty-eight per cent of the total the sources were not stated.

TABLE 15.—*Exhibiting for the ten years 1887-96, the reported sources of contagium of Diphtheria, Scarlet fever, Typhoid fever and Measles in Michigan.*

Diseases.	Traced to former cases.		Traced to outside juris- dictions.		Infection from.							Low water in wells.	Unknown, etc.	Not stated.	Totals.
	Definitely.	Probably.	Definitely.	Probably.	Contam- inated			Unsanitary condi- tions, defective drainage, etc.	Exposure.						
					Water.	Milk and food.	"Old clothing," articles, etc.								
Diphtheria	4,252	178	142	20	49	---	67	919	---	---	9,599	11,654	26,880		
Scarlet Fever	5,230	628	124	55	---	---	83	76	---	---	10,029	11,206	27,431		
Typhoid Fever....	1,269	83	1,132	---	*5,554	16	---	821	---	16	3,976	8,377	21,244		
Measles	7,631	365	589	11	---	---	2	---	105	---	20,259	13,535	42,497		
Totals	18,382	1,254	1,987	86	5,603	16	152	1,816	105	16	43,863	44,772	118,052		

* Includes 52 cases probably traced to contaminated water.

PERIOD OF INCUBATION OF DIPHTHERIA, SCARLET FEVER AND MEASLES.

The three tables 16, 17, and 18, exhibit for the three diseases above named, during specified periods of years, the average periods of incubation reported by health officers of the State. Each of the tables is divided into two parts. The first part treats of instances relative to which the reports stated the period of incubation to have been a *definite* number of days. The second part relates to instances of which reporters stated the periods of incubation as *within certain limits of days*, as, for example, 5 to 10 days.

Tables 16, 17 and 18 show that for diphtheria the average period of incubation for 914 reported cases during the 10 years 1887-96, was 8.1 days, and the greatest number of cases taken sick on the seventh day after exposure. For scarlet fever, for the same period, the average period of incubation reported in 874 cases was 8.9 days, and the greatest number were reported to have been taken sick on the seventh day after exposure. For measles, for the four years 1893-96, the average period of incubation for 372 reported cases was 11.7 days, the greatest number were reported as taken sick on the fourteenth day after exposure.

TABLE 16.—*Exhibiting for the ten years, 1887-96, the average period of incubation in cases of Diphtheria in Michigan, from reports of health officers to the State Board of Health.* (Compiled)

Year	Instances.	Average Incubation Period in days.	Incubation periods in Days—Number of Instances under each Day.																															Average period in days.	Instances.	Incubation—period in certain limits of days.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				32	33	34	35	36	37	38	39	40	41	42	43	44	45	46																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1887...	35	7.3	---	1	9	2	4	3	6	1	---	1	1	1	1	2	1	---	---	---	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---</

TABLE 17.—Exhibiting for the ten years 1887-96, the average period of incubation in cases of Scarlet Fever in Michigan. Compiled from reports of health officers to the State Board of Health.)

Year.	Instances.	Average Period, in days.	Incubation-period in Days—Number of Instances under each Day.																												Incubation—period in certain limits of days.	Average period in days.				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	42	56	
1887.....	23	8.0	---	---	6	---	2	2	5	2	1	2	---	---	---	1	---	---	---	---	1	---	---	---	---	---	---	---	---	---	1	---	---	18	7.8	
1888.....	39	8.1	---	4	---	---	6	1	8	---	7	7	3	---	1	1	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	12	8.6		
1889.....	31	7.0	---	1	1	5	3	2	7	5	2	3	---	---	1	1	---	---	---	---	---	2	1	---	---	---	---	---	---	1	1	---	21	6.8		
1890.....	77	8.8	3	3	4	1	4	4	20	11	4	5	2	1	---	9	1	---	---	---	---	3	1	1	---	---	---	---	---	---	1	---	12	8.4		
1891.....	57	9.1	---	3	3	2	5	5	9	2	10	3	1	1	1	5	1	1	---	---	---	3	1	1	---	---	---	---	---	---	---	---	12	8.8		
1892.....	69	8.6	---	3	3	7	6	6	11	8	4	3	2	4	1	6	1	1	---	---	---	1	---	---	---	---	---	---	1	---	---	---	21	8.7		
1893.....	107	9.4	1	6	3	5	4	10	24	8	4	11	1	7	1	11	1	1	---	2	1	1	---	---	---	---	---	---	---	---	---	---	22	9.6		
1894.....	208	8.1	2	19	13	14	14	20	34	11	18	23	5	3	2	18	2	---	1	1	---	---	5	---	---	1	---	---	1	---	---	---	82	7.9		
1895.....	139	9.8	1	2	6	11	11	4	27	8	3	21	6	5	1	16	4	---	1	1	---	---	7	---	1	---	---	---	1	---	---	---	63	8.8		
1896.....	124	9.8	4	3	6	4	7	6	13	18	10	23	2	2	2	11	2	2	---	---	---	1	3	---	---	---	---	---	2	1	---	---	44	10.0		
Totals.....	871	8.9	11	41	45	49	62	60	158	73	63	101	22	23	10	82	12	5	2	4	6	21	1	1	1	1	1	1	5	1	3	2	4	1	308	8.6

TABLE 18.—*Exhibiting for the four years, 1893-6, the average period of incubation in cases of Measles in Michigan. (Compiled from reports of health officers to the State Board of Health.)*

Year.	Instances.	Average Periods of Incubation in days.	Incubation-period in Days—Number of Instances under each Day.																							Incubation—period in certain limits of days.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
			-----	-----	1	3	-----	-----	7	5	3	7	1	1	7	-----	-----	-----	2	-----	1	1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----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DURATION OF CASES OF SICKNESS FROM DIPHTHERIA, SCARLET FEVER, TYPHOID FEVER AND MEASLES.

Table 19 exhibits, for specified periods of years, the duration of sickness in days, of reported cases of diphtheria, scarlet fever, typhoid fever and measles, which occurred in Michigan. This table is compiled from reports in which the dates of being taken sick and of the death or recovery of patients were definitely stated by health officers.

As computed for this table (19), the duration of sickness of each case of a given disease is the number of days which elapsed from the day of being taken sick to the day of death or recovery; the first, but not the last day inclusive.

TABLE 19.—*Sickness in Michigan, from diphtheria, scarlet fever, typhoid fever and measles. Exhibiting, by sex, for fatal and for non-fatal cases, the duration (in days) of cases.**Diphtheria, 4 years, 1893-6.*

Years.	Cases classified.	Sex.	No. of cases.*	Average duration (in days).	Duration in days—cases.								
					1	2	3	4	5	6	7	8	9
Totals, 4 years...	Fatal.....	{ Males.....	597	8.3	21	37	63	60	63	62	40	41	38
		{ Females....	678	8.2	33	39	63	80	71	74	42	36	28
	Non-fatals..	{ Males.....	1,841	14.1	6	13	25	48	78	74	103	129	120
		{ Females....	2,309	13.9	3	10	30	56	109	102	143	152	178
Total,—Fatal and non-		{ Males.....	2,438	12.7	27	50	88	106	141	136	143	170	158
fatal, 4 yrs....		{ Females....	2,987	12.6	36	49	93	136	180	176	185	188	206

Scarlet fever, 4 years, 1893-6.

Totals, 4 years....	Fatal.....	Males.....	133	12.1	8	9	12	12	8	11	7	11	2
		Females.....	170	10.3	12	15	18	14	12	11	11	7	7
	Non-fatal..	Males.....	2,364	18.9	4	4	16	22	42	59	97	98	88
		Females.....	2,823	18.9	3	8	16	21	52	72	97	120	107
Totals,—Fatal and non- fatal, 4 yrs.....		Males.....	2,497	18.5	12	13	28	34	50	70	104	109	90
		Females.....	2,993	18.4	15	23	34	35	64	83	108	127	114

Typhoid fever, 5 years, 1892-6.

Totals, 5 years....	Fatale-----	{ Males.....	513	22.1	4	7	6	8	8	11	22	15	19
		{ Females....	404	20.3	---	3	7	9	7	10	18	13	14
	Non-fatale..	{ Males.....	2,477	33.7	1	---	1	---	3	3	9	10	4
		{ Females....	1,800	33.5	---	---	---	---	4	3	4	5	7
Totale,—Fatal and non-fatal, 5 yre.		{ Males.....	2,990	31.6	5	7	7	8	11	14	31	25	23
		{ Females....	2,204	31.0	---	3	7	9	11	13	22	18	21

Measles, 5 years, 1892-6.

Totals, 5 years---	Fatal-----	Males-----	33	9.0	2	1	3	3	5	2	1	2	3
		Females---	40	11.4	---	1	6	1	1	4	3	---	3
	Non-fatal..	Males-----	3,690	11.1	4	5	19	80	166	259	343	314	263
		Females---	3,630	11.0	1	8	25	79	206	287	327	310	267
Totals,—Fatal and non-fatal, 5 yrs.		Males-----	3,723	11.1	6	6	22	83	171	261	344	316	266
		Females---	3,720	11.0	1	9	31	80	207	291	330	310	270

Diphtheria, 4 years, 1893-6.

Duration in days—Cases.													
10	11	12	13	14	15	16	17	18	19	20	21	22	23
38	19	8	14	19	12	10	9	11	2	4	3	---	2
39	22	19	21	18	15	9	15	7	8	4	7	8	3
155	102	101	96	106	67	73	66	59	47	51	55	32	27
194	156	123	106	111	105	78	87	75	53	63	57	54	40
193	121	109	110	125	79	83	75	70	49	55	58	32	29
233	178	142	127	129	120	87	102	82	61	67	64	62	43

Scarlet fever, 4 years, 1893-6.

3	5	2	3	3	4	---	4	1	2	2	1	2	3	2	1	2	1	---	1	---
5	6	8	3	5	3	4	---	3	2	1	4	---	1	2	1	2	---	---	1	---
151	98	112	113	111	106	98	78	81	83	66	68	65	50	62	32	44	38	43	33	60
160	116	138	124	159	140	100	101	102	95	79	81	73	55	71	53	44	54	63	51	67
154	103	114	116	114	110	98	82	82	85	68	69	67	53	64	33	46	39	43	34	60
165	122	146	127	164	143	104	101	105	97	80	85	73	56	73	56	44	56	63	52	68

Typhoid fever, 5 years, 1892-6.

18	12	17	21	18	21	18	12	16	12	18	14	24	8	14	12	12	9	15	6	8
19	18	16	26	18	17	10	14	16	6	6	10	8	10	1	12	3	6	12	6	5
12	15	22	17	16	51	26	38	44	39	48	86	67	70	85	79	76	73	91	69	143
14	10	10	12	37	25	34	24	23	30	50	70	52	56	56	56	52	53	67	50	84
30	27	39	38	54	72	44	50	60	51	66	100	91	78	99	91	88	82	106	75	151
33	28	26	38	55	42	44	38	39	36	56	80	60	66	57	68	55	59	79	56	89

Measles, 5 years, 1892-6.

1	---	2	1	---	---	2	1	1	1	---	1	---	---	---	---	---	---	---	1	---
1	3	3	1	2	1	1	1	1	1	1	1	---	---	---	---	---	---	---	1	---
653	325	112	188	188	115	100	80	59	40	55	31	25	20	16	11	7	5	9	6	5
628	314	230	178	164	150	100	86	57	41	39	29	28	26	11	12	12	5	7	3	11
654	325	253	189	188	115	102	81	60	41	55	31	25	21	16	11	7	5	9	6	6
629	317	233	179	166	151	101	88	57	42	40	30	28	26	13	12	12	5	7	4	11

* Compiled from those reports only which stated the duration of sickness, in days, and the sex of the patients.

TABLE 19.—CONCLUDED.

Diphtheria, 4 years, 1893-6.

Duration in days—Cases.																				
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
2	1	1	1	1	1	1	1	2						1		2	1			
6	9	5	5	6	7	2	3	4	5	1		3	6	4	2	1	1		1	2
11	9	10	7	6	5	3	4	4	4	3	1		5	2	3	1	2	1	1	
8	9	5	6	7	7	3	4	6	5	1		3	6	5	2	3	2		1	2
12	10	11	8	7	6	3	4	4	4	3	2	1	5	2	3	1	2	1	1	

Scarlet fever, 4 years, 1893-6.

	1			1	1			1	1		1	1							
32	19	29	21	27	21	16	19	22	14	16	13	10	9	11	4	6	4	4	4
35	37	28	25	49	25	23	22	18	14	17	16	18	11	15	7	6	2	1	2
33	19	29	26	28	25	21	16	19	23	15	16	13	11	10	11	4	6	4	4
35	37	29	28	50	25	23	22	19	14	19	17	18	11	16	7	6	2	1	2

Typhoid fever, 5 years, 1892-6.

9	4	5	4	7	7	3	3	4	2	2	1	7	2	3	5	3	2	2	5	----	2
87	73	59	42	73	71	55	61	42	53	53	46	28	32	39	37	21	32	18	28	22	
72	47	43	48	54	39	35	44	32	44	42	26	23	23	24	24	19	12	16	12	11	
96	77	64	46	80	78	58	64	46	55	45	47	35	34	44	40	23	34	23	28	24	
79	51	48	53	57	43	40	50	36	46	58	31	25	26	29	35	21	14	16	13	13	

Measles, 5 years, 1892-6.

[illegible]

Diphtheria, 4 years, 1893-6.

[illegible]

Scarlet fever, 4 years, 1893-6.

[illegible]

Typhoid fever, 5 years, 1892-6.

2	1	3	1	2	2	3	1	1	1	1	1	2	1	1	1	1	9
24	15	11	13	18	12	20	11	11	12	5	8	8	3	4	9	5	56
18	17	15	8	9	6	7	10	17	8	9	7	6	5	4	2	4	48
26	16	14	13	20	12	14	23	11	13	11	13	5	8	9	3	4	65
18	17	15	11	9	6	7	11	17	9	9	7	6	5	4	2	8	50

Measles, 5 years, 1892-6.

[illegible]

Duration of diphtheria.

Table 19 shows, for diphtheria, that the average duration of *fatal* cases of both sexes, was about eight days; and of non-fatal cases about 14 days. The greatest number of male fatal cases died after 5 days, and of fatal female cases after 4 days sickness. The greatest number of non-fatal cases of both sexes were sick ten days.

Duration of scarlet fever.

Table 19 shows, for scarlet fever, that the average duration of fatal male cases was 12 days and of fatal female cases was 10 days. The duration of non-fatal cases was nearly the same in both sexes—19 days. The greatest number of fatal male cases were sick 3 and 4 days, and of fatal female cases 3 days. The greatest number of non-fatal cases of both sexes were sick 10 days.

Duration of typhoid fever.

According to the data in table 19, the average duration of fatal male cases of typhoid fever was 22 days, and of fatal female cases was about 20 days. For non-fatal cases of both sexes the duration was slightly over 33 days. The greatest number of fatal male cases were reported as having been sick 22 days, and the greatest number of female fatal cases 13 days. The greatest number of non-fatal cases of both sexes recovered on the thirtieth day of sickness.

Duration of measles.

Table 19 shows for measles, that the average duration was, for fatal male cases 9 days, for fatal female cases slightly over 11 days, and for non-fatal cases of both sexes it was about 11 days. The greatest number of fatal male cases were of 5 days, female fatal cases of 3 days, and non-fatal cases of both sexes of 10 days duration.

AGE OF OCCURRENCE OF DIPHTHERIA, SCARLET FEVER, TYPHOID FEVER, MEASLES, AND CONSUMPTION.

Tables 20 and 21 exhibit for diphtheria, scarlet fever, typhoid fever, consumption and measles, for specified periods of years, the total numbers of reported cases of sickness and deaths from these diseases arranged in age-groups, by sexes; and the ratio which the number of each sex and age bears to each 10,000 inhabitants of the State, of the same sex and age.

These tables are compiled from reports of health officers, and include only those cases and deaths of which the sex and age were stated.

The four diagrams (plates 940, 927, 942 and 941) which are based on Table 20, graphically illustrate the sex and age distribution of deaths in Michigan for the four diseases, diphtheria, scarlet fever, typhoid fever, and measles, during the periods therein mentioned:—

Diphtheria.

Table 20 shows, for diphtheria, that the greatest number of cases of sickness and the highest sickness-rate for both sexes were reported as occurring in the age-group of 5 to 9. The greatest number of deaths of males and of females was reported as occurring in the two age-groups under 5 years and 5 to 9 years; and, so far as the table shows, the greatest mortality-rate for both sexes occurred at the age of three years. From 1 to 14 years the sickness-rates and mortality-rates were above the average at all ages.

Scarlet Fever.

Table 20 shows, for scarlet fever, that the greatest number of cases of sickness for both sexes was reported as having occurred in the age-group of 5 to 9 years. So far as the table shows, the greatest sickness-rate of males occurred at 3 years of age, and the greatest sickness-rate of females in the age-period 5 to 9 years. The greatest numbers of deaths of both sexes were reported as occurring in the age-group under 5 years. The greatest mortality-rates of males and of females were at 2 years of age. Excepting the mortality-rate of males 10 to 14, the sickness-rates and mortality-rates from 1 to 14 were above the averages of the totals at all ages. Only one death was reported at over 30 years.

Typhoid Fever.

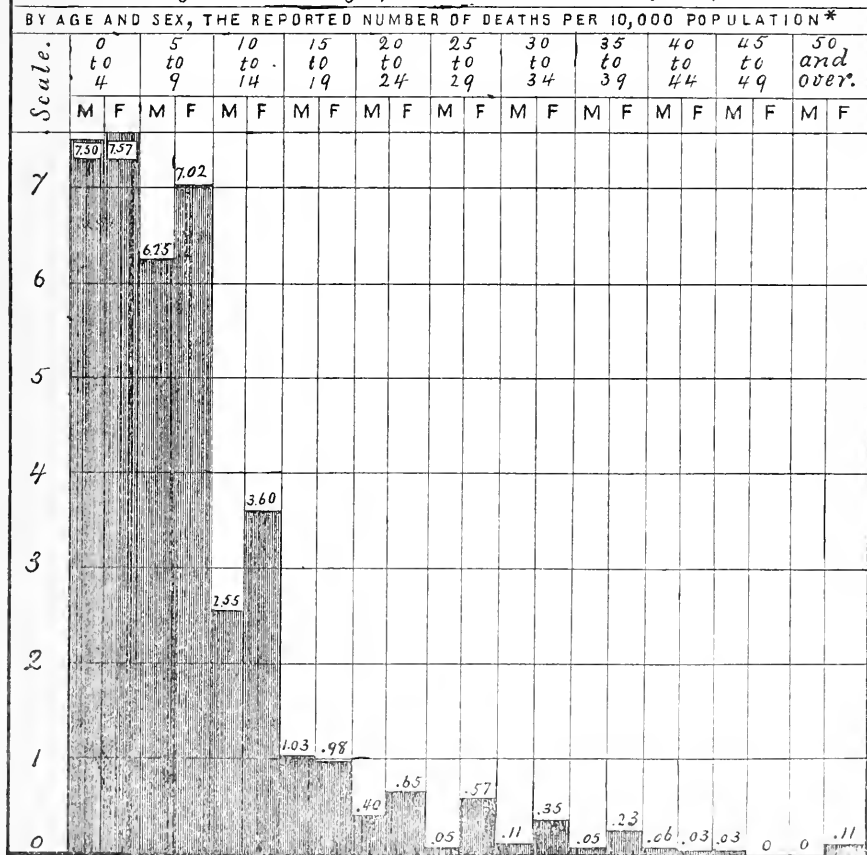
Table 20 shows for typhoid fever, that the greatest numbers of cases of sickness and deaths, and the greatest sickness and mortality-rates were, for males, in the age-group of 20 to 24 years, and for females in one age-group younger, *i. e.*, 15 to 19 years. The sickness-rate of males from 5 to 34 years inclusive, was above the average at all ages. The sickness-rate of females from 5 to 30, was above the average at all ages. The mortality-rate of males from 15 to 39 inclusive was above the average at all ages. The mortality-rate of females from 10 to 34 inclusive was above the average at all ages.

Measles.

Table 20 shows for measles, that the greatest numbers of cases of sickness, and the highest sickness-rates, for both sexes were reported as occurring in the age-group of 5 to 9 years. The greatest number of deaths for both sexes occurred under 5 years, and the greatest mortality-rate for both sexes was at one year of age. From one to 14 years of age, the sickness-rate of males was above the average rate at all ages, and, in general, from birth to 14 years the mortality-rates are greater than the average rate at all ages. Two slight exceptions are for the periods 5 to 9 and 10 to 14 years. After 14 the mortality-rate takes a decided drop.

DEATH-RATES, BY AGE-PERIODS, FROM DIPHTHERIA.

Diagram -- Exhibiting, by Age and Sex, the Average Annual number of reported deaths from diphtheria per 10,000 persons living in Michigan during the five years, 1892-96. Compiled from all reports to the Secretary of the State Board of Health, for the years mentioned, which stated the age and sex of persons who died of diphtheria.*



* Of corresponding sex and age.

[PLATE 940.]

The diagram (plate No. 940) exhibits the results of computations of data extending over the five years 1892-6; whereas the table (20) exhibits the results of computations of data for only the four years 1893-6.

TABLE 20.—Exhibiting for Diphtheria, Scarlet Fever, Typhoid Fever and Measles, by age-groups, the total number of reported cases of sickness and the total number of reported deaths, together with the sickness-rates and death-rates per 10,000 inhabitants of same sex and age, in Michigan, for series of years, stated for each disease. (Compiled from those reports only to the State Board of Health which stated the age and sex of patients.)

Age-groups.	Sex.	Diphtheria, reported.				Scarlet Fever, reported.				Typhoid Fever, reported.				Measles, reported.			
		Totals for 4 years, 1893-96.		Av. annual rates per 10,000 population.		Totals for 4 years, 1893-96.		Av. annual rates per 10,000 population.		Totals for 6 years, 1891-96.		Av. annual rates per 10,000 population.		Totals for 5 years, 1892-96.		Av. annual rates per 10,000 population.	
		Cases of sickness.	Deaths.	Cases of sickness.	Deaths.	Cases of sickness.	Deaths.	Cases of sickness.	Deaths.	Cases of sickness.	Deaths.	Cases of sickness.	Deaths.	Cases of sickness.	Deaths.	Cases of sickness.	Deaths.
Under 1	{ Males.....	16	8	1.99	.69	14	0	1.21	.00	1	0	.06	.00	61	2	4.50	.14
	{ Females....	17	10	1.54	.91	10	1	.91	.09	0	0	.00	.00	64	5	4.71	.37
1 year	{ Males.....	151	56	15.07	5.59	224	17	22.35	1.70	28	8	2.01	.58	385	12	31.89	.99
	{ Females....	185	66	14.13	6.91	183	20	19.16	2.09	24	10	1.81	.75	438	9	38.05	.78
2 years	{ Males.....	240	88	21.37	7.84	379	29	29.30	2.58	54	7	3.23	.42	457	4	32.66	.29
	{ Females....	220	78	20.71	7.34	312	32	29.38	3.01	35	2	2.20	.13	460	9	34.68	.68
3 years	{ Males.....	286	101	26.56	9.38	410	27	38.08	2.51	69	9	4.30	.56	475	3	35.42	.22
	{ Females....	314	107	29.73	10.12	382	19	36.14	1.80	64	5	4.07	.32	469	4	35.62	.30
4 years	{ Males.....	320	99	28.77	8.00	406	26	36.50	2.34	70	4	4.27	.24	570	5	41.34	.36
	{ Females....	308	99	29.25	9.40	438	29	41.60	2.75	63	4	4.36	.26	546	3	41.75	.23
Under 5	{ Males.....	1,013	352	18.53	6.44	1,383	99	25.30	1.81	222	28	2.78	.35	1,951	26	28.92	.39
	{ Females....	994	360	19.00	6.88	1,325	101	25.33	1.93	191	21	2.49	.27	1,977	30	30.60	.46
5 to 9	{ Males.....	1,526	343	30.15	6.78	1,791	60	35.38	1.19	698	34	8.50	.45	3,342	12	53.12	.19
	{ Females....	1,600	367	32.26	7.40	2,156	58	43.47	1.17	549	36	7.46	.49	3,208	8	52.03	.13
10 to 14	{ Males.....	878	127	18.75	2.50	740	11	15.80	.23	708	58	10.81	.83	1,135	6	19.49	.10
	{ Females....	1,100	122	24.15	4.00	1,051	28	23.08	.61	735	76	10.86	1.12	1,205	9	21.27	.16
15 to 19	{ Males.....	392	54	8.78	1.21	219	6	4.91	.13	722	95	10.97	1.44	456	3	8.24	.05
	{ Females....	503	47	11.29	1.06	341	11	7.66	.25	787	126	11.98	1.92	586	2	10.61	.04
20 to 24	{ Males.....	178	18	4.24	.43	83	2	1.98	.05	1,072	168	17.04	2.51	291	2	5.55	.04
	{ Females....	311	22	7.45	.53	134	3	3.21	.07	592	83	9.57	1.34	279	1	5.38	.02
25 to 29	{ Males.....	108	5	2.79	.13	45	2	1.16	.05	789	125	13.65	2.16	131	3	2.71	.06
	{ Females....	220	25	6.01	.68	76	1	2.03	.03	420	60	7.79	1.11	170	2	3.75	.04

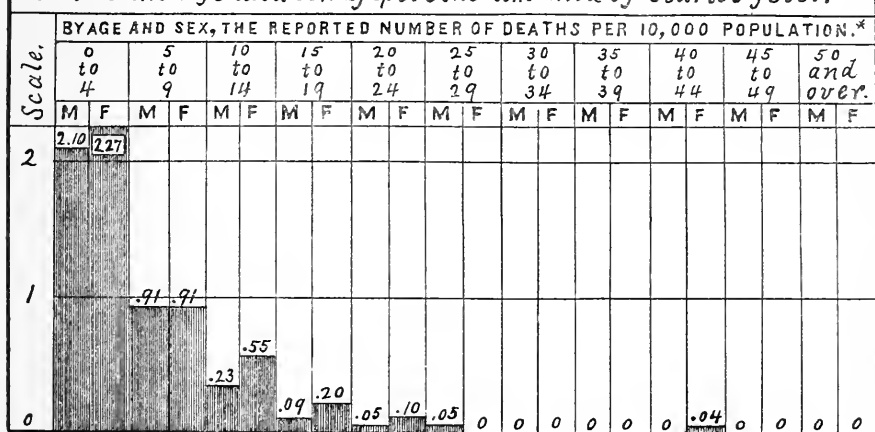
30 to 34	{ Males,----- Females----	71 179	4 9	1.98 5.54	.11 .28	29 51	0 0	.81 1.58	.00 .00	530 313	81 44	9.88 6.66	1.51 .92	96 105	0 2	2.14 2.62	.05 .00
35 to 39	{ Males,----- Females----	55 139	2 7	1.66 4.82	.05 .24	14 32	0 0	.42 1.11	.00 .00	367 191	59 32	7.56 4.57	1.22 .79	55 69	0 1	1.34 1.35	.00 .03
40 to 41	{ Males,----- Females----	33 76	1 4	1.20 3.25	.04 .17	6 14	0 1	.22 .60	.00 .04	211 168	39 24	5.23 4.88	.97 .70	35 31	1 0	1.03 1.07	.03 .00
45 to 49	{ Males,----- Females----	20 39	2 0	.85 1.93	.09 .00	7 5	0 0	.30 .25	.00 .00	152 107	30 18	4.40 3.59	.87 .60	14 22	0 0	.48 .88	.00 .00
50 and over	{ Males,----- Females----	17 56	0 7	.24 .91	.00 .11	2 7	0 0	.03 .11	.00 .00	208 213	62 45	2.02 2.38	.60 .50	8 18	0 3	.09 .24	.00 .04
Totals and Av.	{ Males,----- Females----	4,291 5,217	908 1,030	9.18 11.35	1.94 2.36	4,319 5,192	180 203	9.24 11.90	.38 .47	5,619 4,596	769 565	8.13 6.64	1.11 .88	7,514 7,670	53 58	12.95 14.19	.09 .17

TABLE 21.—*Exhibiting for Consumption in Michigan for the three years, 1894-6, by age-groups, the total number of reported cases and the total number of reported deaths, together with the sickness-rates and the death-rates per 10,000 inhabitants.*

Consumption, reported.					
Age-group.	Sex.	Totals for 3 years, 1894-6.		Annual average rates per 10,000 population.	
		Cases of sickness.	Deaths.	Cases of sickness.	Deaths.
Under 10.....	{ Males.....	10	9	0.13	0.11
	{ Females.....	12	10	0.16	0.13
10 to 14.....	{ Males.....	5	3	0.14	0.08
	{ Females.....	26	21	0.76	0.61
15 to 19.....	{ Males.....	34	28	1.01	0.83
	{ Females.....	88	68	2.61	2.02
20 to 24.....	{ Males.....	72	56	2.28	1.78
	{ Females.....	122	98	3.87	3.11
25 to 29.....	{ Males.....	55	40	1.69	1.38
	{ Females.....	103	71	3.72	2.56
30 to 34.....	{ Males.....	68	46	2.51	1.70
	{ Females.....	88	70	3.61	2.87
35 to 39.....	{ Males.....	61	40	2.42	1.59
	{ Females.....	77	55	3.50	2.50
40 to 44.....	{ Males.....	30	20	1.44	0.96
	{ Females.....	50	40	2.82	2.26
45 to 49.....	{ Males.....	28	16	1.58	0.90
	{ Females.....	30	23	1.97	1.51
50 to 54.....	{ Males.....	23	18	1.48	1.16
	{ Females.....	19	10	1.38	0.72
55 to 59.....	{ Males.....	13	10	1.17	0.89
	{ Females.....	18	16	1.79	1.59
60 to 64.....	{ Males.....	21	12	2.14	1.22
	{ Females.....	15	10	1.77	1.18
65 to 69.....	{ Males.....	7	6	1.01	0.86
	{ Females.....	24	22	4.01	3.68
70 to 74.....	{ Males.....	8	6	1.60	1.20
	{ Females.....	11	7	2.68	1.78
75 and over.....	{ Males.....	8	7	1.70	1.49
	{ Females.....	6	6	1.45	1.45
Totals.....	{ Males.....	443	317	1.25	0.90
	{ Females.....	689	527	2.09	1.60

Table 21 shows for consumption, that the greatest number of cases and deaths of both sexes, occurred in the age-period 20 to 24 years; that the highest sickness-rate of males was in the age-period 30 to 34 years, and of females in the age-group 65 to 69. The highest death-rate for males was in the age-group 20 to 24 years, and for females in the age-group 65 to 69 years.

Diagram.— Exhibiting, by Age and Sex, the Average Annual number of reported deaths from Scarlet fever per 10,000 persons living in Michigan during the four years, 1893-96. Compiled from all reports to the Secretary of the State Board of Health, for the years mentioned, which stated the age and sex of persons who died of Scarlet fever.*



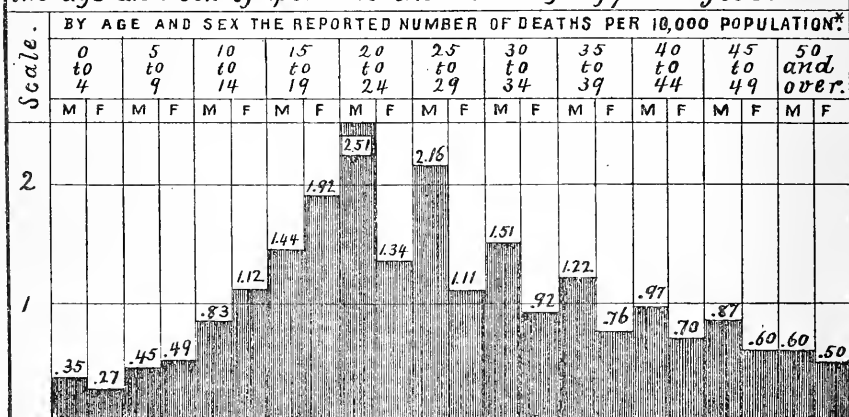
* Of corresponding sex and age.

[PLATE 927.]

The death-rates exhibited in the diagram (plate No. 927) do not exactly agree with those shown in the Table (20). The apparent inconsistency of the two sets of numbers, is due to the fact that the diagram, having been constructed before the table was made, was drawn from data obtained from a slightly different method of grouping by age-groups from that on which the data used in the table were based.

DEATH-RATES, BY AGE-PERIODS, FROM TYPHOID FEVER.

Diagram .- Exhibiting, by Age and Sex, the Average Annual number of reported deaths from Typhoid fever per 10,000 persons* living in Michigan during the six years, 1891-96. Compiled from all reports to the Secretary of the State Board of Health, for the years mentioned, which stated the age and sex of persons who died of Typhoid fever.

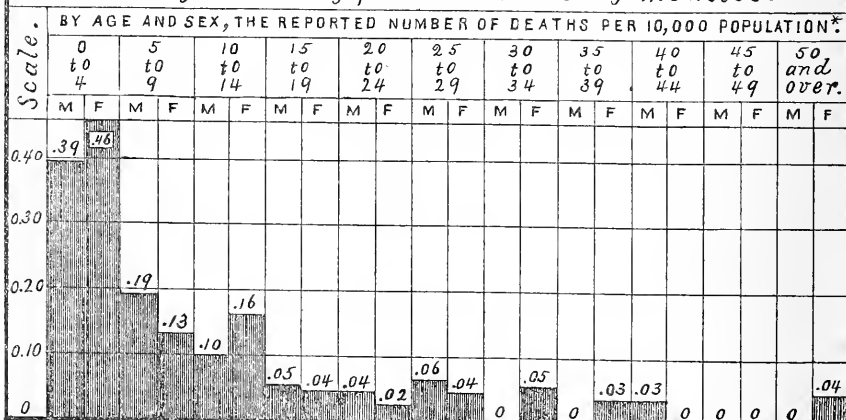


* Of corresponding sex and age.

[PLATE 942.]

DEATH-RATES, BY AGE-PERIODS, FROM MEASLES.

Diagram .- Exhibiting by Age and Sex, the Average Annual number of reported deaths from measles per 10,000 persons* living in Michigan during the five years, 1892-96. Compiled from all reports to the Secretary of the State Board of Health, for the years mentioned which stated the age and sex of persons who died of measles.



* Of corresponding sex and age.

[PLATE 941.]

*Age and Average age, in Years, of persons sick with, and of decedents from:
Diphtheria, scarlet fever, typhoid fever and measles.*

Table 22 shows for diphtheria, scarlet fever, typhoid fever and measles, for certain specified periods of years, and by sexes, the numbers of reported fatal and non-fatal cases concerning which the ages were stated, which occurred in persons at each year of age from birth to 75 years; and the average age of persons sick and of decedents in each class of persons.

Diphtheria.

The average age of fatal male case was slightly over 7 years, and of fatal female cases slightly over 8 years; of non-fatal male cases it was slightly over 11 years, and of non-fatal female cases it was nearly 14 years. The greatest number of fatal male cases were reported as of 5 years of age, fatal female cases as of 3 years; of non-fatal male cases as of 7 years, and of non-fatal female cases as of 8 years of age.

Scarlet Fever.

The average age of fatal male cases was over 5 years, of fatal female cases over 6 years, of non-fatal male cases nearly 8 years, of non-fatal female cases nearly 9 years. The greatest numbers of both male and female fatal cases were reported as of 2 years of age, and the non-fatal cases of both sexes as of 6 years of age.

Typhoid Fever.

The average age was: for fatal male cases slightly over 27 years, of fatal female cases nearly 25 years; of non-fatal male cases slightly over 22 years and of non-fatal female cases 21 years. The greatest number of fatal male cases were reported as of 21 years of age, of fatal female cases 16 years, of non-fatal male cases 30 years, and of non-fatal female cases 16 years of age.

Measles.

The average age of fatal male cases was nearly 8 years, of fatal female cases slightly over 10 years, of non-fatal male and female cases about 9 years. The greatest number of fatal male cases were reported as of 1 year of age, fatal female cases as of 1 and 2 years; and non-fatal cases of both sexes as of 6 years of age.

TABLE 22.—*Actual and Average Age of Persons in Michigan, sick with diphtheria, scarlet fever, typhoid fever, and measles. Exhibiting, by sex, for fatal and for non-fatal cases, the age and the average age in years.**Diphtheria, 4 years, 1893-6.*

Years.	Cases classified.	Sex.	No. of cases.*	Average age (in years).	Age in years—No. of cases.									
					Under 1.	1	2	3	4	5	6	7	8	9
Totals, 4 years----	Fatais.....	Males.....	908	7.1	8	56	88	101	99	106	83	56	48	50
		Females.....	1,030	8.3	10	66	78	107	99	77	94	69	76	51
	Non-fatais..	Males.....	3,383	11.2	8	95	152	185	221	239	242	263	221	218
		Females.....	4,187	13.9	7	69	142	207	209	255	264	227	268	219
Totals, Fatais and non-fatais, 4 yrs.-----		Males.....	4,291	10.3	16	151	240	286	320	345	325	319	269	268
		Females.....	5,217	12.8	17	135	220	314	308	332	358	296	344	270

Scarlet fever, 4 years, 1893-6.

Totals, 4 years----	Fatais.....	Males.....	150	5.4	1	17	29	27	26	17	16	13	8	6
		Females.....	203	6.4	1	20	32	19	29	19	14	7	9	9
	Non-fatais..	Males.....	4,139	7.8	14	207	300	383	380	366	436	355	327	247
		Females.....	4,989	8.8	9	163	280	363	409	437	481	421	418	321
Totals, Fatais and non-fatais, 4 yrs.-----		Males.....	4,319	7.7	14	224	329	410	406	383	452	368	335	253
		Females.....	5,192	8.7	10	183	312	382	438	476	495	428	427	330

Typhoid fever, 6 years, 1891-6.

Totals, 6 years----	Fatais.....	Males.....	789	27.2	8	7	9	4	3	6	3	9	13	9
		Females.....	565	24.6	10	2	5	4	4	11	6	6	6	13
	Non-fatais..	Males.....	4,850	22.1	1	20	47	60	66	104	119	144	114	123
		Females.....	3,701	21.0	14	33	59	64	74	98	120	111	110	110
Totals, Fatais and non-fatais, 6 yrs.-----		Males.....	5,619	22.8	1	28	54	69	70	107	125	147	123	136
		Females.....	4,266	21.5	24	35	64	68	78	109	126	117	119	119

Measles, 5 years, 1892-6.

Totals, 5 years----	Fatais.....	Males.....	53	7.9	2	12	4	3	5	2	4	2	4	2
		Females.....	58	10.2	5	9	9	4	3	1	1	1	3	2
	Non-fatais..	Males.....	7,461	8.8	62	373	453	472	565	648	843	718	639	482
		Females.....	7,612	9.2	59	429	451	465	543	701	674	673	642	420
Totals, Fatais and non-fatais, 5 yrs.-----		Males.....	7,514	8.8	64	385	457	475	570	650	847	720	643	482
		Females.....	7,670	9.2	64	438	460	469	546	702	765	674	645	422

Diphtheria, 4 years, 1893-6.

Age in years—No. of cases.																														
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30										
40	18	32	25	12	14	11	14	10	5	5	5	1	6	1	3	1	1	---	---	---										
48	34	44	30	26	11	12	8	13	3	4	5	6	2	5	8	6	3	7	---	---										
226	140	146	124	115	83	72	75	66	42	47	31	26	30	26	29	26	14	22	12	25										
225	173	190	157	173	107	109	79	103	58	81	45	62	50	51	53	52	25	42	23	78										
266	155	178	149	127	97	83	89	76	47	52	36	27	36	27	32	27	15	22	12	25										
273	207	234	187	199	118	121	87	116	61	85	50	68	52	56	61	58	28	49	24	83										

Scarlet fever, 4 years, 1893-6.

2 5	2 7	4 4	3 7	----- 5	2 2	1 3	2 3	1 1	----- 1	2 1	----- 2	----- 1	----- 1	1 1	----- 1	----- 1	----- 1	----- 1	----- 1	----- 1
241 323	124 219	178 209	108 150	78 122	65 83	62 81	40 54	29 73	17 39	23 47	10 23	17 19	17 22	14 20	18 13	7 10	8 15	6 24	4 13	16 18
243 328	126 226	182 213	111 157	78 127	67 85	62 84	41 57	31 75	18 40	23 47	12 24	17 21	17 22	14 20	18 14	8 10	8 15	6 24	5 13	16 18

Typhoid fever, 6 years, 1891-6.

11	12	8	8	19	10	18	12	35	20	31	42	35	24	26	34	33	17	28	13	26										
11	11	15	17	22	20	28	24	31	23	22	22	22	9	8	8	9	10	24	9	17										
159	109	160	108	114	86	128	131	155	127	190	189	208	170	156	193	145	106	157	63	210										
140	111	151	118	139	118	167	131	144	101	145	79	116	78	91	111	75	53	81	40	122										
170	121	168	116	133	96	146	143	190	147	221	231	244	194	182	227	178	123	185	76	236										
151	122	166	135	161	138	195	155	175	124	167	101	138	87	99	119	84	63	105	49	139										

Measles, 5 years, 1892-6.

$\frac{3}{4}$	$\frac{1}{3}$	$\frac{2}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$	$\frac{1}{1}$
387	214	249	146	133	95	102	86	101	69	74	73	59	48	35	43	22	20	23	20	46
365	244	233	203	151	133	150	103	101	96	103	44	43	48	40	52	35	26	34	21	41
390	214	250	146	135	95	103	86	102	70	74	74	59	48	36	44	22	21	24	20	46
369	245	236	203	152	134	150	103	102	97	103	44	44	48	40	52	36	26	34	22	42

* Compiled from those reports only which stated the age and sex of patients.

TABLE 22.—CONCLUDED.

Diphtheria, 4 years, 1893-6.

Age in years—Number of cases.																				
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
1	1	---	2	---	1	---	1	---	---	---	1	---	---	1	---	1	---	---	---	---
---	3	---	1	4	---	1	2	---	3	---	1	---	---	---	---	---	---	---	---	---
7	13	10	12	21	11	5	7	9	17	1	5	3	6	9	---	2	5	2	7	3
15	30	26	21	64	19	19	24	6	35	6	12	13	6	13	3	10	6	7	17	3
8	14	10	14	21	12	7	8	9	17	1	6	3	6	10	---	3	5	2	7	3
15	33	26	22	68	19	20	26	6	38	6	13	13	6	13	3	10	6	7	17	3

Scarlet fever, 4 years, 1893-6.

---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---
3	5	2	3	5	2	2	4	1	5	1	---	---	---	4	2	---	1	1	---	---
8	11	9	5	16	5	2	4	5	5	---	5	1	2	2	---	1	1	1	2	---
3	5	2	3	5	2	2	4	1	5	1	---	---	4	2	---	1	1	---	---	---
8	11	9	5	16	5	2	4	5	5	---	6	1	2	2	---	1	1	1	2	---

Typhoid fever, 6 years, 1891-6.

10	23	10	12	25	11	9	6	8	22	2	6	8	1	12	6	2	7	3	9	2
5	9	7	6	12	6	5	9	---	10	3	7	2	2	9	3	2	3	1	3	---
42	98	56	43	125	59	43	68	13	91	19	32	14	16	52	18	20	27	5	34	5
29	61	25	26	68	30	13	34	14	62	16	32	15	19	36	10	11	19	13	42	6
52	121	66	55	150	70	52	74	21	113	21	38	22	17	64	24	22	34	8	43	7
34	76	32	32	80	36	18	43	14	72	19	39	17	21	45	13	13	22	14	45	6

Measles, 5 years, 1892-6.

---	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---
11	20	10	9	23	9	9	8	6	14	4	8	4	4	7	3	1	3	2	---	---
11	27	12	12	28	12	10	13	5	14	5	7	3	2	7	5	3	3	4	1	4
11	20	10	9	23	9	9	8	6	14	4	8	5	4	7	5	3	1	3	2	---
11	28	12	12	29	12	10	13	5	14	5	7	3	2	7	5	3	3	4	1	4

Diphtheria, 4 years, 1893-6.

Age in years—Number of cases.																				
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
1	1	1	1	1	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---
2	2	2	2	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---
2	6	2	4	2	1	3	---	2	1	---	---	---	1	---	2	---	2	---	1	---
2	2	2	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---
3	7	3	5	3	1	3	---	2	1	1	---	---	1	---	2	---	2	---	1	---

Scarlet fever, 4 years, 1893-6.

---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	1	---	---	---	1	---	---	1	---	---	---	---	1	---	---	---	---	---	1	---
2	1	---	---	---	1	---	---	1	---	---	---	---	1	---	---	---	---	---	1	---
2	---	---	---	---	---	---	---	1	---	---	---	---	1	---	---	---	---	---	1	---

Typhoid fever, 6 years, 1891-6.

5	2	2	5	3	2	2	2	4	3	1	1	1	4	1	1	---	2	1	1	---
3	1	2	6	3	2	2	---	10	2	1	1	2	2	1	---	---	---	---	1	---
9	6	6	15	8	2	7	5	10	2	5	6	7	4	1	---	2	1	2	3	---
9	5	10	16	13	3	7	2	16	2	2	2	2	10	3	2	5	3	1	---	---
14	8	8	20	9	4	9	7	14	5	6	7	8	8	2	1	2	2	2	3	---
12	6	12	22	16	3	9	2	26	4	3	3	4	12	3	3	5	3	1	2	---

Measles, 5 years, 1892-6.

---	---	---	---	---	---	---	---	1	---	---	---	---	1	---	---	---	---	---	---	---
---	---	---	1	---	---	---	---	---	1	---	---	---	1	---	---	---	---	---	---	3
---	1	---	2	1	2	---	1	1	---	---	1	2	---	---	---	---	---	---	---	---
---	---	---	1	---	---	---	---	---	1	---	---	---	1	---	---	---	---	---	---	---
---	1	---	2	1	2	---	1	2	---	---	---	1	3	---	---	---	---	---	---	3

EFFICACY OF ISOLATION AND DISINFECTION IN RESTRICTING DANGEROUS COMMUNICABLE DISEASES IN MICHIGAN.

The laws of Michigan provide that local health officials shall report to the State Board of Health on the occurrence of all outbreaks of dangerous communicable diseases which occur in their jurisdictions; and that efforts shall be made for the restriction and prevention of such diseases.

For a number of years past the State Board has persistently demanded compliance by health officers and local boards of health, with these provisions of law, and incessantly urged the adoption of restrictive and preventive measures in connection with every outbreak of such disease.

The principal measures recommended by the State Board for adoption by local health officials in the prevention and restriction of dangerous communicable diseases, are isolation of every person sick with one of those diseases from all other persons except necessary attendants and attending physicians, and complete disinfection of all rooms, and articles of any kind which may, either by personal contact with, or near proximity to, those sick have become infected with the germs of such diseases.

A large number of health officials comply with the provisions of the health laws, and act on the recommendations of the State Board relative to isolation and disinfection. On the other hand, there are many instances in which, for one reason or another the people of the locality neglect to avail themselves of isolation and disinfection to prevent the spread of disease. Another class of health officials report to the State Board the occurrence of all outbreaks of communicable diseases in their jurisdictions, but fail to state definitely in their reports whether or not they acted on the recommendations of the State Board relative to isolation and disinfection.

During a series of years all information contained in reports to this office relative to the application of isolation and disinfection in outbreaks of dangerous communicable diseases has been carefully compiled with a view of ascertaining, if possible, the efficacy of those measures in restricting the prevalence of those diseases. Table 23 and accompanying three diagrams (Plates 922, 929 and 943), present some of the results of the collation of that information.

Reliability of these contagious disease statistics.

It is impossible to obtain the exact proportion of health jurisdictions reporting previous to the year 1892, but it has been carefully estimated that not over 60 per cent of all localities reported to the Secretary of the State Board of Health, during the 8 or 10 years immediately preceding the year 1892. Averages for the five years, 1892-6, show that 82 per cent of the cities, 87 per cent of the villages, and 94 per cent of the townships made annual reports to this office; of all jurisdictions throughout the State 92 per cent made reports.

Diphtheria.—Results of isolation and disinfection.

Relative to Diphtheria, Table 23 shows that in 576 outbreaks of the disease reported during the ten years 1887-96 relative to which health officers stated that isolation and disinfection were neglected, there oc-

curred a total of 7,492 cases of sickness and 1,559 deaths, or an average of 13.01 cases and 2.71 deaths per outbreak; whereas in the 649 outbreaks which were reported to have occurred in the same period and in which it was stated that isolation and disinfection were enforced, there occurred only 1,374 cases of sickness and 305 deaths an average of 2.12 cases and .47 of one death per outbreak, thus showing that the sickness and deaths attending outbreaks which were treated in conformity with the recommendations of this Board were only about one-sixth as great as attended outbreaks where those recommendations were neglected.

Scarlet Fever.—Results of isolation and disinfection.

Table 23 shows that the experiences of health officers with isolation and disinfection in outbreaks of scarlet fever during the ten years 1887-96 were very similar to those reported for diphtheria. In the 900 reported outbreaks of scarlet fever during the ten years in which isolation and disinfection were stated to have been neglected, there occurred 12.79 cases of sickness and .51 of one death per outbreak, and in those 582 outbreaks, during the same period, in which those restrictive measures were enforced there were only 2.25 cases of sickness and .10 of one death per outbreak,—nearly six times as many cases of sickness and five times as many deaths in outbreaks where isolation and disinfection were neglected as there were in outbreaks where those measures were enforced.

Typhoid Fever.—Results of isolation and disinfection.

Relative to typhoid fever, the experiences, compilations of reports of which are comprised in Table 23, extend over a shorter period (seven years, 1890-96) and embrace a less number of outbreaks than do those relative to diphtheria and scarlet fever. There were, however, 493 reported outbreaks of typhoid fever during the seven years in which isolation and disinfection were neglected, with an average of 7.77 cases of sickness and .96 of one death per outbreak; whereas in the same period there were 374 reported outbreaks in which isolation and disinfection were enforced, with only 2.43 cases of sickness and .34 of one death per outbreak or over three times as many cases of sickness and nearly three times as many deaths in outbreaks where isolation and disinfection were neglected as there were in those outbreaks where those restrictive measures were enforced.

Measles.—Results of isolation and disinfection.

Table 23 shows relative to measles that during the seven years 1890-96 there were 501 reported outbreaks in which isolation and disinfection were neglected with an average of 64.94 cases of sickness and .57 of one death per outbreak; and 93 reported outbreaks in which isolation and disinfection were enforced, with an average of 2.54 cases of sickness and no deaths per outbreak, or over 25 times as many cases in the neglected outbreaks as there were in those outbreaks where restrictive measures were enforced.

TABLE 23.—*Exhibiting for Diphtheria and Scarlet Fever for the ten years, and each of the ten years, 1887-96, and for Typhoid Fever and Measles, for the seven years and each of the seven years, 1890-96, the numbers of outbreaks, cases and deaths and the average numbers of cases and deaths, in all reported outbreaks of those diseases; also the numbers of outbreaks, cases and deaths in outbreaks where Isolation and Disinfection were neglected and where those measures were enforced; and the indicated saving of cases of sickness and lives by Isolation and Disinfection. (Compiled in the Office of the Secretary of the State Board of Health from reports of local officials.)*

DIPHTHERIA.

Year.	All Outbreaks.					Isolation and Disinfection both Neglected.					Isolation and Disinfection both Enforced.					Indicated Saving of Cases and Lives by Isolation and Disinfection.	
	Outbreaks.	Cases.	Deaths.	Average per outbreak.		Outbreaks.	Cases.	Deaths.	Average per outbreak.		Outbreaks.	Cases.	Deaths.	Average per outbreak.		Cases.	Lives.
				Cases.	Deaths.				Cases.	Deaths.				Cases.	Deaths.		
1887-----	398	2,321	561	5.83	1.41	60	822	195	13.70	3.25	78	198	51	2.54	0.65	3,132	733
1888-----	311	1,529	324	4.92	1.04	34	527	81	15.50	2.38	58	101	31	1.74	0.53	3,292	416
1889-----	376	1,986	418	5.28	1.11	41	478	108	11.66	2.63	63	98	14	1.56	0.22	2,398	571
1890-----	439	2,713	619	6.18	1.41	71	902	169	12.70	2.38	46	70	15	1.52	0.33	2,862	426
1891-----	532	2,965	643	5.57	1.21	79	944	194	11.95	2.46	70	157	33	2.24	0.47	3,392	666
1892-----	525	3,485	740	6.64	1.41	52	657	147	12.63	2.83	49	105	24	2.14	0.49	3,146	746
1893-----	536	3,133	746	5.85	1.39	74	1,020	282	13.78	3.81	65	159	45	2.45	0.69	4,253	1,296
1894-----	420	2,292	404	5.39	.96	56	738	122	13.18	2.18	81	176	37	2.17	0.46	3,274	512
1895-----	388	2,292	425	5.91	1.10	45	610	119	13.56	2.64	70	146	28	2.09	0.40	2,989	599
1896-----	405	2,460	432	6.07	1.07	64	794	142	12.41	2.22	69	164	27	2.38	0.39	2,566	467
Totals-----	4,330	25,116	5,312	-----	-----	576	7,492	1,559	-----	-----	619	1,374	305	-----	-----	31,284 31,187	6,432 6,422
Averages-----	433	2,515	531	5.81	1.23	58	719	156	13.01	2.71	65	137	31	2.12	.47	3,128	643

SCARLET FEVER.

1887	299	1,882	141	6.29	0.47	32	440	34	13.75	1.06	64	148	11	2.31	0.17	2,229	176
1888	340	1,838	112	5.41	0.33	61	724	33	11.89	0.54	36	80	3	2.22	0.08	2,498	72
1889	417	2,822	123	6.77	0.29	72	1,708	48	16.78	0.67	52	140	10	2.69	0.19	4,175	136
1890	477	3,054	115	6.40	0.24	94	1,137	36	12.10	0.38	42	76	1	1.81	0.02	2,718	66
1891	62	4,936	193	8.20	0.32	111	1,704	66	12.09	0.47	42	167	1	2.55	0.02	2,342	90
1892	622	5,240	306	8.42	0.49	110	1,621	59	14.74	0.54	42	97	7	2.31	0.17	3,928	30
1893	667	5,219	327	7.82	0.49	124	1,511	93	12.19	0.80	60	157	8	2.62	0.13	2,912	207
1894	662	4,349	175	6.57	0.26	104	1,348	42	12.96	0.40	74	17	9	2.53	0.12	4,231	90
1895	555	2,905	85	5.23	0.15	82	1,138	27	13.88	0.33	92	162	4	1.76	0.04	4,798	98
1896	389	1,534	42	3.94	0.11	80	681	16	8.51	0.20	78	153	4	2.00	0.51	1,776	36
Totals	5,030	33,779	1,619			960	11,512	470			582	1,307	58			31,307	1,021
Averages	503	3,378	162	6.72	.32	90	1,151	46	12.79	.51	58	131	6	2.25	.10	3,131	102

TYPHOID FEVER.

1890	330	1,924	304	5.83	0.92	53	319	51	6.85	0.96	38	75	12	1.97	0.32	247	13
1891	541	4,018	607	7.43	1.12	56	1,196	114	21.36	2.04	31	54	9	1.74	0.29	7,538	497
1892	524	2,195	416	4.19	0.79	41	183	38	4.46	0.93	35	65	9	1.86	0.26	142	71
1893	539	2,255	405	4.10	0.75	47	240	25	5.11	0.53	33	54	8	1.64	0.24	499	*0
1894	596	2,537	405	4.26	0.68	61	282	32	4.62	0.52	47	132	15	2.81	0.32	217	*0
1895	792	3,453	524	4.36	0.66	137	917	138	6.69	1.01	85	294	41	3.46	0.48	1,845	276
1896	629	2,236	329	3.55	0.52	98	666	77	6.80	0.79	105	233	32	2.22	0.30	2,041	168
Totals	3,951	18,618	2,990			493	3,833	475			374	907	126			12,529	1,025
Averages	564	2,660	427	4.71	0.76	70	548	63	7.77	0.96	53	130	18	2.43	0.34	1,789	146

TABLE 23.—CONCLUDED.—*Lives saved by isolation and disinfection.*

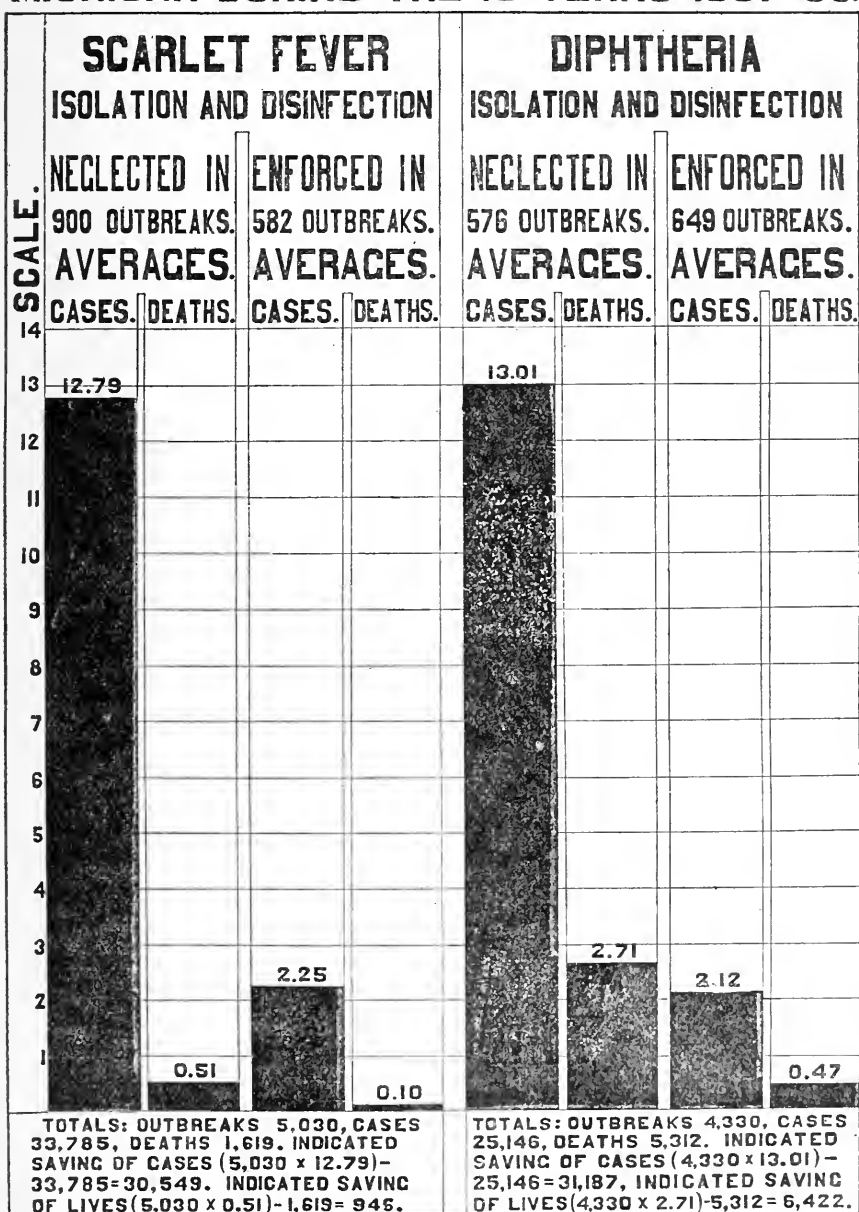
MEASLES.

Year.	All outbreaks.				Isolation and Disinfection both neglected.				Isolation and Disinfection both Enforced.				Indicated Saving of Cases and Lives by Isolation and Disinfection.	
	Out-breaks.	Cases.	Deaths.	Average per outbreak.	Out-breaks.	Cases.	Deaths.	Average per outbreak.	Out-breaks.	Cases.	Deaths.	Average per outbreak.	Cases.	Lives.
1890	419	11,189	103	26.70	57	4,819	44	84.54	6	19	0	3.17	24,233	220
1891	392	12,338	118	31.47	71	5,920	63	83.38	11	27	0	2.45	20,347	231
1892	236	4,406	67	18.67	31	1,953	22	63.00	7	8	0	1.14	10,462	101
1893	357	5,440	71	15.21	70	2,681	14	38.30	10	24	0	2.40	8,233	*0
1894	358	7,345	49	20.52	70	2,971	7	42.44	13	32	0	2.46	7,849	*0
1895	269	4,462	13	16.59	56	1,563	6	27.90	25	72	0	2.88	3,043	17
1896	399	17,068	158	42.78	146	12,626	131	86.48	21	54	0	2.57	17,438	201
Totals	2,430	62,248	579	-----	501	32,533	257	-----	93	236	0	-----	91,605	770
Averages	347	8,893	83	25.62	72	4,648	41	64.94	13	34	-----	2.54	13,086	110

* By the last column in Table 23 it may be seen that there is no apparent saving of lives from typhoid fever and measles in the years 1893 and 1894. This showing is due to the fact that health officers, before or in a great many instances, to state whether or not restrictive measures were adopted in outbreaks of these diseases; or, made doubtful statements relative to the communicable diseases of the doubtful class, and relative to typhoid fever and measles, the number of outbreaks in that class is consequently increased to very large proportions of the whole number of outbreaks which occurred. It is probable that if full information could be obtained relative to every outbreak, the percentage of the whole number of them would be found to have been neglected, the neglected class thereby greatly increased, and a saving of lives shown. Another fact which may have a bearing on this subject is, that the sickness and deaths from typhoid fever and measles, which occurred in Detroit and Grand Rapids, where these diseases prevail more or less nearly all the time, and where no doubt many outbreaks are neglected, are (for reasons explained in the articles on typhoid fever and measles in this Report) not included in Table 23. The same is true of Ironwood in 1893, where typhoid fever was extensively epidemic during the year and from it a large number of cases of sickness and deaths occurred.

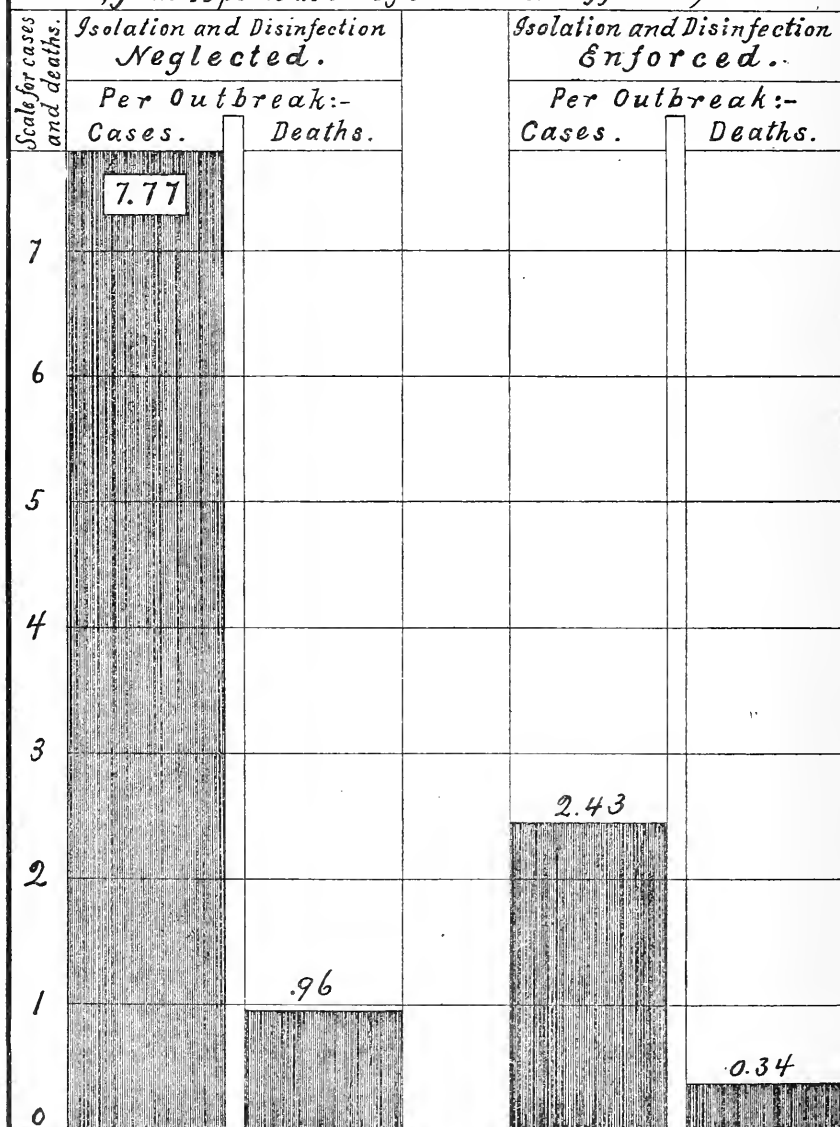
Until more perfect reports relative to outbreaks of typhoid fever and measles are obtainable, it will not be possible, in this manner, by itself, to determine with any great degree of accuracy the effects of applied isolation and disinfection in the prevention of sickness and deaths from those diseases.

ISOLATION AND DISINFECTION RESTRICTED SCARLET FEVER AND DIPHTHERIA IN MICHIGAN DURING THE 10 YEARS 1887-'96.



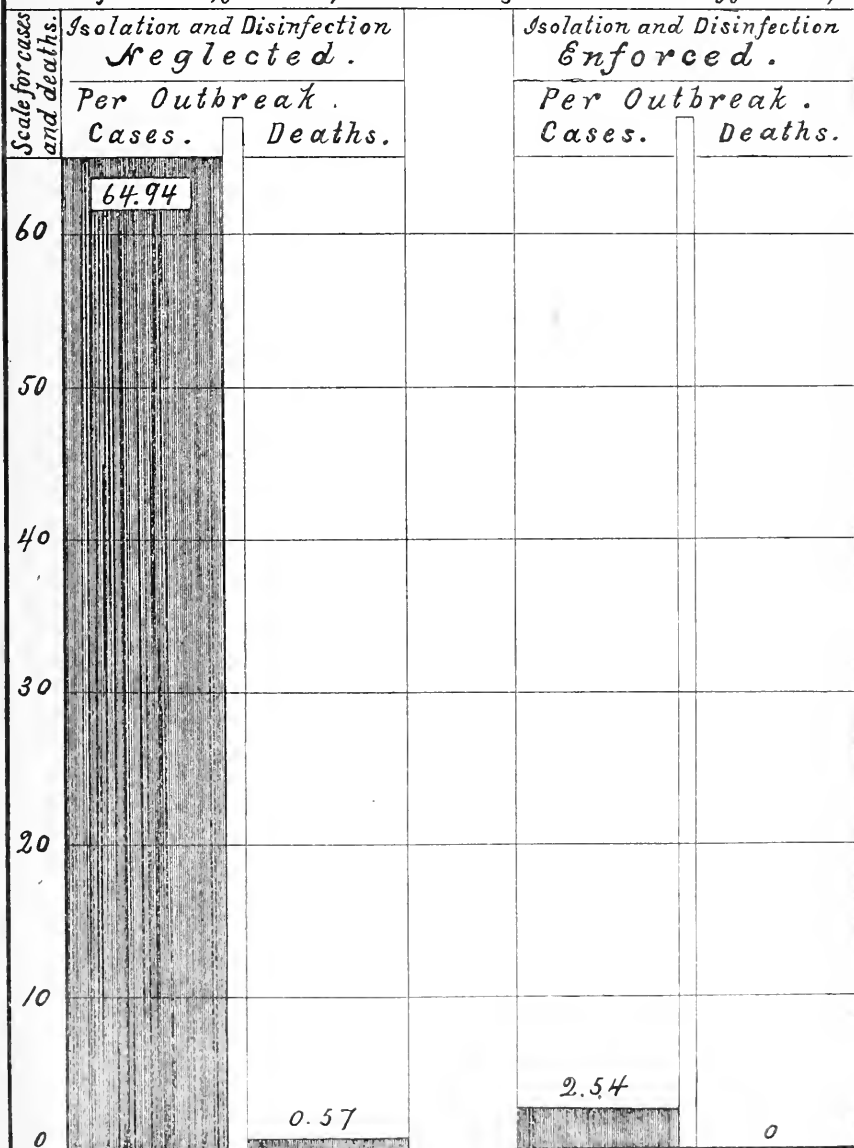
Isolation and Disinfection Restrict Typhoid fever.

Typhoid fever in Michigan in the 7 years, 1890-96:- Exhibiting the average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)



ISOLATION AND DISINFECTION RESTRICT MEASLES.

Measles in Michigan in the seven years, 1890-96:- Exhibiting the average numbers of cases and deaths per outbreak:-in all outbreaks in which Isolation and Disinfection were both neglected; and in all outbreaks in which both were enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)



A change was made in the compilation of scarlet fever for the year 1896 after Plate 922 was constructed. Instead of the number of cases being 33,785 as stated on the plate, the correct number is 33,779 as shown in the Table. Therefore the cases of sickness prevented would be 33,555 instead of 33,549. This slight change does not affect the rates.

Table 23 and accompanying diagrams (Plates 922, 929 and 943) demonstrate several facts which have an important bearing upon public-health work in Michigan:—

1. That in a large number of outbreaks of diphtheria, scarlet fever, typhoid fever and measles, isolation and disinfection restricted those diseases far below the average occurrence in outbreaks in which restrictive measures were neglected; and that it is therefore reasonable to assume that if communicable diseases can, in large numbers of instances, be thus restricted, there exists no good reason why they should not be restricted in *all* instances and their occurrence, if not entirely prevented, at least reduced to a minimum of frequency.

2. That by the restriction of diphtheria, scarlet fever, typhoid fever and measles in Michigan during the periods named in the table and diagrams, 21,134 cases of sickness and 1,001 deaths annually have been prevented.

Human suffering cannot be estimated in money values, but the prevention of these 21,134 cases of sickness and 1,001 deaths annually, by isolation and disinfection, has probably saved the State from pecuniary losses which would aggregate over a million dollars annually.

At the Sanitary Convention held in Detroit, December 9 and 10, 1897, Dr. Leartus Connor said:—

“Most sickness and premature deaths are caused by communicable diseases, such as adequate public health work can limit and in the end ultimately destroy. *It follows that the needs of public-health work are as great as the desirability of abolishing the ravages of communicable diseases.* We grant the task a herculean one, but the results of a past quarter of a century give promise of larger advances in the immediate future.”

“Perhaps the most important need of public health work, is to awaken public thought to realize that millions of deaths could be averted yearly, if only the means now offered by science, were practically applied to this end; that most cases of sickness could be prevented; that the time spent in nursing the sick, could be transferred to some productive effort which would increase the common wealth of the race; that the disturbances in business, in society, in education, due to cases of sickness and deaths could be obviated, and so better results attend the several enterprises with which the sick and dead were associated; and that every sickness and death stops production and retards developments of many enterprises.”

With its limited annual allowance what has the Michigan State Board of Health to state in regard to limiting and ultimately destroying the ravages of communicable diseases? It has much to say, and Table 23 shows but a part of the work it has done along the line of life-saving.

In all outbreaks of a dangerous communicable disease, the State Board has strongly advocated the restriction and prevention of the disease by the scientific, practical, and effective methods of the so-called Michigan Plan, which are: popular education in sanitary science, and, through the

general coöperation resulting from that education, the complete isolation and thorough disinfection of the sick and infected.

In proof of the fact that these measures have been effective, Table 23 shows that during the ten years, 1887-96, from diphtheria, a total of 31,284 cases of sickness and 6,432 deaths; from scarlet fever a total of 31,307 cases of sickness and 1,021 deaths; and for the seven years, 1890-96, from typhoid fever a total of 12,524 cases of sickness and 1,025 deaths; and from measles 91,605 cases of sickness and 770 deaths have been saved to the State of Michigan. This means that by depositing a meagre annual allowance—a trust fund, so to state—the people of the State of Michigan annually draw out thousands of times the value of a priceless gift of God—a human life. Is not its plea for extension of efforts, and along as yet unworked branches of sanitary science, worthily founded?

And yet much remains to be done. The following Table 24, summarized from Table 23, shows that during the ten years, 1887-96, for diphtheria restrictive measures were enforced in 15 per cent of the outbreaks, neglected in 13 per cent, and doubtful or incomplete in 72 per cent; for scarlet fever, enforced in 12 per cent, neglected in 18 per cent, and doubtful or incomplete in 70 per cent. And for the 7 years, 1890-96, for typhoid fever, restrictive measures were enforced in 9 per cent of the outbreaks, neglected in 12 per cent, and doubtful or incomplete in 79 per cent; and for measles, enforced in 4 per cent, neglected in 26 per cent, and doubtful or incomplete in 70 per cent.

TABLE 24.—*Exhibiting, for 10 years, 1887-96, for diphtheria and scarlet fever, and for the 7 years, 1890-6, for typhoid fever and for measles, the total number of outbreaks; the number of outbreaks and per cent of the total number of outbreaks in which restrictive measures were enforced, neglected, and doubtful or incomplete. (Data from Table 23.)*

Diseases.	Restrictive measures.						
	Total number of outbreaks.	Enforced.		Neglected.		Doubtful or incomplete.	
		No. of outbreaks.	Per cent of total outbreaks.	No. of outbreaks.	Per cent of total outbreaks.	No. of outbreaks.	Per cent of total outbreaks.
Diphtheria.....	4,330	649	15	576	13	3,105	72
Scarlet fever....	5,030	582	12	900	18	3,548	70
Typhoid fever.....	3,951	374	9	493	12	3,084	79
Measles.....	2,430	93	4	501	26	1,836	70

Table 23 shows that for diphtheria and scarlet fever, there were about six times as many cases of sickness and deaths in those outbreaks where restrictive measures were neglected as there were in outbreaks where these measures were enforced; for typhoid fever there were over three times as many, and for measles* over twenty-five times as many.

Even the one-sixth as many cases of sickness and deaths, which existed in those outbreaks where restrictive measures were enforced compared with those outbreaks where those measures were neglected, seems a great deal, and in only 15 per cent of the total number of outbreaks were restrictive measures enforced. And this "one-sixth" probably represents

* For cases only, there being no deaths in those outbreaks where restrictive measures were enforced.

almost infinitely more sickness and mortality from those diseases, than would result if restrictive and preventive measures were enforced in every outbreak throughout the State. The spread of the contagium would then be correspondingly decreased, and the conquest of these diseases would be complete.

The caution and labor on the part of each citizen of this State, in the work of exterminating the "Germ Army" is indeed small compared with the benefit and interest accruing to ourselves and to our posterity.

"The State's interest in the subject under consideration is the interest which her two and one-quarter millions of inhabitants sustain to their bitterest and most malignant foe. It is an interest they have in an enemy who does its work stealthily but who every year enters three thousand homes in Michigan and drags to an untimely grave a member from each one of these homes. It is the interest they feel in an assassin who spares neither age, sex nor condition, but ruthlessly tears from the family the father, the mother, or the idolized son or daughter. Not one of the other sinister foes of humanity equals this one in the number of its victims. War, pestilence and famine with all their forces combined march far in the rear of this commanding destroyer who exacts as his tribute one-seventh of the entire human race. Can the interest in such an enemy be a trifling one? Can the State fail to heed the cries of the three thousand of her children who every year at the beck of this slayer, leave her offices, her farms, her pulpits, her stores, her shops, her schools, and her homes never to return? If she can, her title is empty and vain and her children are unworthy their heritage of humanity."

The foregoing was spoken by the Hon. Frank Wells, President of the State Board of Health, at the Detroit Sanitary Convention, held in Detroit in December, 1897. Mr. Wells was speaking with reference to consumption, but his forcible words are to some extent applicable to the need for destroying the entire germ army.

Replies to questions in concurrent resolutions of Legislature.

In the concurrent resolutions of the Michigan Legislature of 1897 which authorized the Quarter-Centennial Celebration of the Establishment of the Michigan State Board of Health, it was one of the specifications "that the State board of health is hereby authorized and requested to prepare accurate comparative statements * * * of the actual conditions of health in Michigan before and since the establishment of the board, especially exhibiting, if it be true, that there has been a very marked improvement in the healthfulness of Michigan in recent years, and statements of the principal dangers to life and health at the present time."

In compliance with the above, the tables and statements embodied in the foregoing summary, are presented for as long a period of years as reports have been made to the Secretary of State and to the Secretary of the State Board of Health, and these reports have been compiled and tabulated with the greatest care to attain accuracy. The Summary presents, for the diseases named, accurate and comparative statements regarding: the general prevalence; the geographical prevalence; the seasonal prevalence; the death-rates by periods of years; the prevalence in cities, villages and townships; the various sources of contagia; the periods of incubation; for each sex, the ages at which the greatest sick-

ness has prevailed; for each sex, the amount of sickness and of mortality, with their respective rates per 10,000 inhabitants, in age-periods; for each sex, the duration of the greatest amount of sickness, and a tabulated statement of the lives saved and sickness prevented by the employment of the scientific, practical, and effective methods of the Michigan Plan of restricting dangerous diseases.

As to conditions of public health before and since the establishment of the Board, the tables and accompanying diagrams exhibiting the mortality by periods of years, and by single years, fully prove, that for those diseases which the Board has acted upon there has been a very marked decrease in the mortality.

The tables show that there has been a very great improvement in healthfulness in recent years.

As to the "dangers to life and health at the present time", the table relative to the various sources of contagia shows, in general, the ideas of the local health officers as to the principal dangers; because the principal dangers are from the communicable diseases. This subject, however, is concisely treated in a leaflet publication of this Board, No. 226, entitled "Dangerous Communicable Diseases, how spread, how restricted and prevented." That leaflet shows that the most dangerous communicable diseases, named in the order of their importance as causes of deaths, are: Consumption, pneumonia, influenza, diphtheria, scarlet fever, measles, whooping-cough, and small-pox.

For the restriction and prevention of these diseases, the State Board of Health is still laboring; it is carrying on its "campaign of education", endeavoring in this manner to gain the coöperation of all classes of people in the measures which are essential for the restriction of these diseases.

PNEUMONIA IN MICHIGAN IN 1896.

During the calendar year 1896, the occurrence of eight cases of pneumonia attended with three deaths, was reported to the Secretary of the State Board of Health. Three of these cases with one death were reported by the health officer of Barton township, Newaygo county, as having occurred in his jurisdiction. The other five cases with two deaths occurred in Albion city, in the practice of Dr. Roland L. Parmeter, and were brought to the knowledge of this Board by Prof. Delos Fall at the regular meeting of this Board at Lansing Jan. 8, 1897. The following extract from the proceedings of the Board at said meeting explains the object of Prof. Fall in introducing this subject to the consideration of the Board:—

"Prof. Fall mentioned that there had recently been brought to his attention an outbreak of pneumonia which tended to show the communicability of the disease. There were five cases and two deaths, which all seem to have been spread directly, one after another, from preceding cases. That pneumonia is a germ disease has been demonstrated; that it is a dangerous communicable disease there is no question. It is now known that exposure to cold and to the germ causes pneumonia. There are at least two species of germs either one of which causes pneumonia. Just which one was present in this instance was not ascertained. Probably, after a time, we shall be able to distinguish the different forms of the disease due to the different germs. But, before this can be done, physicians who have such outbreaks in charge must see that, from the germs present, cultures are made by some competent bacteriologist, and records must be made of the signs and symptoms, so that these may be compared with those in outbreaks due to the different germs.

"Pneumonia is a disease which causes many deaths in Michigan in every year; and while the State Board have done much for the education of the people preparatory to its restriction, the Board has not yet recommended isolation of patients as in diphtheria, scarlet fever, and small-pox. It is anxious to collect all the information it can bearing upon the modes by which pneumonia is spread, in order that, as soon as practicable, the best measures may be recommended for its restriction."

The following note of Dr. Parmeter gives a brief history of the cases and deaths from pneumonia which occurred at Albion to which Prof. Fall referred in his presentation of this subject to the Board:—

"*Case No. I. Lobar Pneumonia.* Boy aged 10 years. Taken sick March 9, 1896. Sick about 8 days. Recovered.

"*Case No. II. Lobar Pneumonia.* Herman Beilfus aged 33 years, father of cases Nos. I and III. Taken sick March 18, 1896. Sick about 2 days. Died March 20, 1896.

"*Case No. III. Lobar Pneumonia.* Boy aged 4 years. Taken sick March 20, 1896. Sick about 10 days. Recovered.

"*Case No. IV. Lobar Pneumonia.* Albert Beilfus aged 33 years. Brother of case No. II. Taken sick March 27, 1896. Died April 8, 1896.

"*Case No. V. Lobar Pneumonia.* Mrs. Conrad Bemos, neighbor of case No. IV. Aged about 38. Nursed case No. IV part of the time. Taken sick April 9, 1896. Sick about 11 days. Recovered.

"*Note.* Case No. IV helped nurse cases Nos. I and II.

"The residences of cases Nos. I, II and III were the same.

"The residences of cases Nos. IV and V were adjacent, and at a distance from cases Nos. I, II and III.

"All these cases occurred among Germans of the laboring class."

The above-mentioned 8 cases of sickness and 3 deaths from pneumonia, although the only sickness and deaths from that disease reported to this office as instances of a dangerous communicable disease, do not by any means represent all the sickness and deaths which occurred in the State during the year from pneumonia. Reference to Exhibit IV. of the article

entitled "Statistical Study of Sickness in Michigan in 1896" (printed on page 93 of this Annual Report) shows that on 18 per cent of the 3,940 card reports received at this office from observers in different parts of the State during the year, the presence of pneumonia was reported.

PUERPERAL FEVER IN MICHIGAN IN 1896.

During the calendar year 1896, the occurrence of only one case of puerperal fever was officially reported to this office. It occurred in Mussey township, St. Clair county. The health officer of the locality in reporting the case stated that precautionary measures had been taken to prevent the spread of the disease.

Although this is the only case of this disease reported to this office by a health officer, many cases of the disease must have occurred in the State during the year. This is shown by the fact that on 74 (two per cent) of the postal-card-reports received during the year from observers in various parts of the State, the presence of puerperal fever was reported. It is also shown by the fact that 46 deaths from puerperal fever in Michigan were reported to the Secretary of State for the year 1896.

Although physicians generally believe that puerperal fever is communicable, this is not generally understood by the people, and it does not seem to be appreciated as it should be by either people or physicians that useful results would follow the systematic reporting and consequent study of this disease.

MUMPS (PAROTITIS) IN MICHIGAN IN 1896.

During the year 1896, six outbreaks of mumps with an aggregate of eighty-seven cases, were reported to this office from the following localities: Dalton township, Muskegon county, 7 cases; Laketon township, Muskegon county, 8 cases; Mottville township, St. Joseph county, 5 cases; Traverse City, 1 case; Bushnell township, Montcalm county, 1 case; Grand Rapids, 69 cases.

In reporting the outbreak in Laketon township, the health officer of the jurisdiction wrote:—"We have in our jurisdiction 8 cases of mumps in mild form, but seems to be quite contagious. Is it necessary to quarantine them?"

To this enquiry the Secretary replied:—"While it is true that mumps is a contagious disease, yet it is not considered a very fatal or dangerous one, and therefore this Board has never taken any action in regard to it. I do not think it legally necessary to quarantine those who may have that disease; but at the same time it would be well for all who can do so to keep away from the premises and infected persons."

MILK SICKNESS OR "TREMBLES" IN MICHIGAN IN 1896.

MILK SICKNESS IN LOCKPORT TP., ST. JOSEPH COUNTY.—INVESTIGATION BY DR. G. H. CATTERMOLE.

August 8, 1896, a letter was received at this office from Dr. W. M. Ikeler, Health Officer of Three Rivers, St. Joseph Co., reporting an "epi-

demic of milk sickness" in the family of Joseph C. Dougherty, of Lockport Township. August 21, Doctor Ikeler requested that some one be sent from this office to investigate the causes of the disease, and on August 28, Dr. George H. Cattermole of the Office of the State Board of Health was sent by the Secretary of this Board to make an investigation.

The information showed that for several years previous to 1896, similar sickness had occurred, and cattle pastured in the same place were sick and caused illness in persons, and that sheep died apparently from the same cause. In 1890, or "about six years before 1896," six persons were ill of a similar disease, one died and one "is still an invalid," four head of young cattle also died. In 1894, six lambs died. In 1895 one person was ill, 19 sheep and one calf died, and one cow was sick. In 1896 four cows were sick, one of which was killed and another died; nine persons using the milk from the sick cows were ill, with one fatality, and one hog fed on the milk was also sick. Besides these cases, there were two suspected cases in Three Rivers city in persons, and one cow from which the suspected cases obtained the milk, and which was pastured near the others.

Dr. Cattermole's report gives a history of the outbreak, the nature of the cases of sickness, and so far as could be learned, the cause. His report is substantially as follows:

"Report of the Investigation of an Outbreak of Milk Sickness in Lockport Township, St. Joseph County.

"About six years ago a Mr. Langton lived on the adjoining farm to the one owned by Mr. Dougherty which is on the St. Joseph river bottom in Lockport township, and about six miles north of the city of Three Rivers; the two farms lying on the same side of the St. Joseph River. That summer he lost four head of young cattle, and there were four persons sick in his family at the same time that the cattle were sick. One of these persons nearly succumbed to the disease, and has been an invalid since then.

"The same year that the sickness occurred in Mr. Langton's family, Lester Kennedy, a man living on the opposite side of the river, was sick with apparently the same disease as that in the Langton family. That same year Jas. Clark is said to have died of this disease. He lived four miles above Dougherty's place. Clark's ailment was called "gastric fever" at that time.

"Two years ago Mr. Dougherty lost six lambs, of a disease which he is now satisfied was "trembles". The lambs had been feeding in the same pasture that was used by the cattle affected in the present outbreak.

"Last year Arthur Handshaw lost nineteen sheep and lambs from a disease resembling "trembles." They had been feeding on the river bottom across from Mr. Dougherty's pasture. No cattle were feeding on the river bottom at that time.

"Mr. Arndt who lives on an adjoining farm to Dougherty's (and in whose family there have been three cases of the disease this year), says that last year he lost a calf, of this same disease. The cow was sick at the time, but recovered. They did not use milk from this cow, but I am told that one of his daughters had what they called "bilious fever" last year, but the disease had the same symptoms as those in the present cases.

"In the present outbreak the first animal noticed to be sick was a two-year-old heifer belonging to Mr. Dougherty. The herd had been feeding on the river bottom. On the evening of July 31, this heifer did not come in with the other cattle so Mr. Dougherty went to look for her. He found her in the pasture near the river; she would not drive at first; when he finally got her started home she would go a little way and then lie down; on being urged to move on faster she would have a violent fit of trembling, especially noticeable about the head and neck; with feet spread wide apart to brace herself. This heifer was sick for a week when Mr. Dougherty decided she could not recover so killed her. She showed no special symptoms after being put in the barn; there was great prostration, the animal lying down all the time. Ten days after the first animal was taken sick a milch cow fell down in the road one night when it was being driven home; it is said to have turned around several times and then fallen down, but soon recovered sufficiently to be driven home.

"There was nothing peculiar in the taste or appearance of the milk. They stopped using it twelve days after the heifer was taken sick. All milk, cream and butter was thrown out. The cattle were not taken off the bottom land pasture for twelve days after the heifer was taken sick. During that time the family used the milk freely, drinking it for breakfast in place of coffee.

"After the milk was suspected of being the cause of sickness some of it was fed to a hog, and it is said to have sickened him so that he could not walk without staggering and falling down. The milk was fed to cats with no result.

"Members of the Dougherty family have been sick with symptoms as follows:

"(1) Robert D., aged 13, taken sick before the heifer showed any symptoms. He had vomiting, no fever or diarrhea; was sick one week (in bed three or four days), was then up and about for ten days, when he was taken sick again with the same symptoms—vomiting, burning in the stomach but no diarrhea. The second attack lasted one week. He is now about and gaining flesh. All the cases have a ravenous appetite on recovery.

"(2) Bernard D., aged 10, was taken sick about July 23, with same symptoms as his brother. They had no doctor for him; it was thought to be a bilious attack. His first illness lasted ten days; he was then better for thirteen days, when he was taken again with the same symptoms as in the first attack but more severe. He had taken no milk between first and second attacks. In the second attack he had a temperature of 98°, pulse 120.

"(3) Mr. D., aged 38, taken sick August 1, with vomiting, pain in the stomach; was in bed ten days; after the fourth day he took no food but the vomiting continued. Vomited matter changed from a clear fluid, to the colors of green, yellow and dark brown. His saliva was very bitter and sickening to the patient. The breath had a very strong, offensive odor.

"(4) Mrs. D., aged 28, was taken sick August 6, with vomiting, pain in the back and bowels, temperature 96½°, pulse 124. She was sick in bed eight days; died on Thursday, August 13. She was in great agony until a short time before death, with pain in breast and stomach; there was delirium at times during the last two days. No diarrhea.

"(5) Katie D., aged 9, was taken sick August 8, with same symptoms as the others, but milder in form. She rested quietly, was sick in bed for 7 days.

"Mr. Dougherty's well is a very old moss-covered, stone walled one, and it is only fifteen rods from the St. Joseph River. The stage of water in it is affected by the amount of water in the river. The privy is in good condition; has box for contents, and this is emptied frequently. I advised boiling the water used from this well.

"I visited the home of Mr. Arndt, situated about one-half mile from Mr. Dougherty's place, where I found the following cases:

"(6) Mrs. Arndt, aged about 65, who was taken sick three weeks ago. She was then sick for three days, followed by a few days of relief from symptoms, then had a second attack which lasted three days. She was taken with the third attack the day that I saw her, Aug. 28, and was having great pain in her limbs and stomach, nausea and vomiting, and was constipated.

"(7) Sadie Arndt, aged 20, was taken sick three weeks before; was sick for 3 or 4 days, vomited some, and had slight fever. She used but little milk.

"(8) Mrs. Felton, who has been visiting there from Indiana, was taken sick five weeks ago. She was ill for two weeks, had vomiting and pain in stomach and bowels but no diarrhea. She has gone back to Indiana.

"There were four members of this family who were not affected.

"Mr. Arndt had his cattle in the same pasture on the river bank where the cattle which were sick the year before had pastured. Two of his milch cows have been sick, one died and the other has now recovered. The veterinary surgeon called it 'gastric fever'. They stopped using the milk four weeks ago. Mr. Arndt's well-water is good; from a drive well 33 ft. deep, with good depth of water.

"(9) Mrs. Bower, a daughter of Mr. Arndt, lived on the adjoining farm. The Bower family consists of Mr. and Mrs. Bower and Mr. Bower's mother. Mr. B. and his mother do not use milk. Mrs. B. got milk for her own use from her father's place. She was taken sick with the same symptoms as the other patients; she was sick for two weeks, was then better for a few days, when she had a second attack, in which she was sick for one week.

"Their well water is good, from a drive well 46 ft. deep.

"Dr. Knowles, of Three Rivers, attended the Arndt and Bower families, and made the diagnosis of Milk Sickness. Dr. Gee of Centerville is attending the cases in Mr. Dougherty's family. Dr. Knowles was in the northern part of the State when I made my visit to Three Rivers, and I did not succeed in meeting Dr. Gee. Dr. R. H. Hunt, Vet. Surg., of Three Rivers, saw some of these cattle, and called the disease 'Trembles'. He

was in Jackson at the time I visited Three Rivers, but Dr. Ikeler said he would secure a report of the cases from him, and send it to the Secretary of the State Board of Health.

"Doctor Seidmore of Three Rivers gave me the following history of a case of suspected Milk Sickness which occurred in that city:

"John Row had been pasturing a cow on the bottom lands of the Portage River, about two miles above the city. The cow was taken sick with what Dr. Hunt (V. S.) called 'Trembles'. Besides trembling, the cow was restless, and seemed to have some fever. She was sick one week.

"The Row family consisted of the father, mother and six children; they all drank of the milk. Mrs. Row had colic, diarrhea and fever, lasting four days. One child, three years old, had symptoms similar to those of the mother, but was ill only two days. Both have now recovered.

"A sample of the milk taken from Mr. Dougherty's cows about seven days after they were shut up and supplied with cut feed, was taken by me to Prof. V. C. Vaughan, who will examine it for pathogenic bacteria.

"Dr. Clark and Mr. Sam'l Reed found Water Hemlock and Belladonna growing just outside of Mr. Dougherty's pasture, but none inside the pasture. (One or both of these plants may have grown there and have been eaten by the cows.)

"Conclusion.

"Judging from the histories of the cases, as given above, I concluded this was probably an outbreak of Milk Sickness. The recurrence of attacks of 'Trembles' among animals pasturing on the bottom lands of the rivers in Lockport township would indicate that there is where the cattle and sheep must have received the poison, whatever its nature may be, and that the way to prevent further disease from 'Trembles' among the animals, and illness from Milk Sickness among the people, would be to discontinue the use of these low lands as pastures, or as some authorities state, to place the land under cultivation for a time, as this is alleged to make the pastures perfectly safe.

"A theory which seems plausible as to the cause of this disease is that some fungus or bacterium develops on the grasses or weeds in these low lying pastures, is eaten by the cattle, generates its poison in them with resultant symptoms called 'Trembles', the germ finds its way into the milk of the cow, this milk being taken into the stomach of the calf or into the human stomach, the germ develops on the food there present, and generates its poison, this poison irritates the stomach, causes burning pain, nausea and vomiting until the poison and food is expelled, this is followed by relief from symptoms, until more food is taken, when if the germ is still present it develops again, and there is a recurrence of the symptoms. Such relapses were observed in a number of the cases mentioned in this report, and are not easily accounted for on the theory that the cause is an alkaloid or other chemical poison.

"As far as I could learn, animals had been taken off these pastures in Lockport township. I advised Dr. Ikeler, health officer of the city of Three Rivers, to notify the dairymen of that place, that milch cows should not be pastured on bottom lands until more is known of the cause of this sickness.

"Lansing, August 31, 1896.

"Very respectfully submitted,

GEO. H. CATTERMOLLE."

A sample of the milk, as well as a sample of the urine of one of the patients was sent to Dr. Victor C. Vaughan, Director of the Laboratory of Hygiene at the University of Michigan, Ann Arbor, but nothing was found in either sample which would seem to indicate anything of a poisonous nature. Of the sample of the milk, Dr. Vaughan says:

"We have examined this sample thoroughly, both chemically and bacteriologically, and fail to find any abnormality in the same."

It is desirable that, at the proper season, an investigation be made of the vegetation in the pastures in that vicinity. Prof. Wheeler, botanist at the Michigan Agricultural College, has expressed his willingness to cooperate in such an investigation.

VIOLATION OF PUBLIC-HEALTH LAWS. ILLUSTRATIVE INCIDENT.

June 27, 1896, H. W. Jones, M. D., health officer of Houghton village, Houghton county, wrote as follows to the Secretary of this Board relative to a violation, in that village, of section 1676 Howell's Statutes, which provides for the reporting by attending physicians, of every case of a communicable disease which occurs in their practice:—

"There is one case of typhoid fever in town in the hands of a physician who says it is not contagious and refuses to report same.

"I have called the attention of the council to it and they put it in the hands of the Board of Health who cannot make him report and notwithstanding my having placed in their hands all the printed matter of the State concerning same, some of them seem to think it is *not* contagious. * * * * We shall virtually have nothing to report in the future if each physician is allowed to use his judgment in such matters and defy the law.

July 7, 1896, replying to Dr. Jones' letter, the Secretary wrote:—

"I have written the president of the village placing before him the law, and urging him to see that the health laws are enforced in Houghton. The president of the village really has no jurisdiction, it is the duty of the *health officer* by law to report any failures to the *prosecuting attorney*, and the law requires action by that attorney.

"I hope there will be no delay in enforcing the law."

On the same date the Secretary wrote also to the president of the village, as follows:—

"This Office is informed that there is at least one case of typhoid fever in Houghton which is not reported to the health officer as the law requires. Herewith I send you a marked copy of the law.

"Typhoid fever is a 'disease dangerous to the public health' and should be restricted. For that purpose it is important that every case be promptly reported to the health officer. Section 1684 Howell's Statutes makes it the duty of every health officer of a village to give notice to the prosecuting attorney of the county of any failure of a householder or physician to report a case of a disease dangerous to the public health. Section 842 Howell's Statutes requires the prosecuting attorney to prosecute every such case. For purposes of study in this office it is also important that every case be reported to the health officer so that he can make reports to this office.

"In the interest of good health in your village, I hope you will do all that is possible to see that these health laws are enforced."

July 15, 1896, the following letter was received by the Secretary from A. T. Streeter, prosecuting attorney for Houghton county:—

"Mr. R. M. Hoar, President of the Village of Houghton, has handed me your letter of 7th inst.

"Although the Village Health Officer has made no complaint, nor given any notice to me, from what I know there seems to be no occasion for a prosecution for the penalty.

"Houghton is entirely within the township of Portage. The attending physician was the Health Officer of Portage township. The Health officer of Houghton knew about the case though a formal notice was not given. Under the circumstances a trial would not be for the benefit of the public, in my opinion. What do you think of it?"

July 18, 1896, the Secretary replied to Mr. Streeter's letter as follows:—

"Please accept cordial thanks for your letter of July 15, relative to an alleged violation of section 1676 Howell's Statutes. I am not thoroughly acquainted with the circumstances in this case, but if there was a case of typhoid fever in the village of Houghton, and the attending physician did not report it to the village health officer in accordance with

section 1676 Howell's Statutes, such physician should suffer the penalty of the law, more especially because he is a township health officer and should know just what the law is. The township of Portage and the incorporated village of Houghton are entirely separate jurisdictions, even though the village is entirely situated in the township.

"I have this morning written to Doctor Jones, health officer of the village, *whose duty it is by law to notify you of any violation.*"

APPOINTEES WOULD NOT QUALIFY AS HEALTH OFFICER.

June 22, 1896, Dick Dewey, clerk of Waterford township, Oakland county, wrote to the Secretary of this Board as follows, relative to the appointment of a health officer in said township:—

"The Board of Health of the Township of Waterford, Oakland county, Mich., has appointed *two* health officers this year and neither will qualify, nor can we find a man that will.

"What would you advise in such a case? We have only one practicing physician in the township, and he will not have the office as he claims it is detrimental to his practice."

June 25, 1896, the Secretary replied to Mr. Dewey's letter as follows:—

"Replying to your letter of June 22, I send you herewith a copy of the leaflet publication of this office relative to the work of local boards of health and local health officers, in which I have marked parts bearing upon the subject of the appointment of a health officer. I think perhaps that the difficulty with your board comes from the fact that you do *not make it an object* for a physician to hold the office. I would advise that your board make such inducements to secure a good health officer, as will secure one. I think the law is a good one, and it should be fulfilled.

"I hope your board will not longer delay in complying with the law relative to the appointment of a health officer."

ALLEGED CHEESE POISONING IN MICHIGAN IN 1896.

During the year ending December 31, 1896, there were reported to the office of the State Board of Health, 2 instances, in two localities, of sickness from cheese poisoning in Michigan; one a report which was not sufficiently investigated on the part of the health officer, (nor was analysis made of the cheese), or reports of which did not reach this office, so that mere mention is sufficient concerning it; the other, a well-defined and authenticated instance.

Seven cases without fatality, were reported from these localities.

The first instance of cheese poisoning reported to this office in 1896, was from Davison, Genesee Co., Mich., and was reported as having caused two cases. In reporting the instance, E. D. Gardner, M. D., said:—

"There came to my notice last night, two cases of cheese poisoning, by cheese made by the Richfield factory. The sickness caused by the cheese made there last summer was wide-spread and would be up to the hundreds. Some of them very seriously sick."

April 6, 1896, a letter was sent from this office to Dr. Gardner as follows:—

"If the Village of Davison does not wish that cheese brought into their village, the board of health should frame and publish regulations in accordance with sections 1636 and 1639 Howell's Statutes. The sale of it can be easily regulated by your village board of health if necessary.

"If you will let me know the address of the factory, I will write them and see if it is not for their interest not to sell such poisonous cheese.

"It would be well to make complaint to your local health officer."

ALLEGED CHEESE POISONING AT BELDING.

December 30, 1896, Dr. I. S. Morris, health officer of Belding, Ionia county, wrote to the Secretary of this Board as follows:—

"Enclosed you will find a sample of cheese which, I mistrust, contains tyrotoxicon. Cheese just cut and a family of three all sick last night with vomiting slimy mucus and some blood streaked. Will you please analyze same and let me know if it does."

A letter was sent from this office to Dr. Morris on Dec. 31, 1896, acknowledging the receipt of his report and the sample of the cheese; but expressing some doubt of the possibility of a successful examination on account of the smallness of the sample sent; also informing Dr. Morris that this office had no facilities for analysis, but that the sample would be sent to Dr. V. C. Vaughan, at the State Laboratory of Hygiene, at Ann Arbor. A letter was also sent from this office to Dr. Vaughan on the same date, quoting a portion of Dr. Morris' letter and sending the cheese, for analysis to find if it contained tyrotoxicon.

January 5, 1897, a larger sample of the cheese was sent by Dr. Morris, and was immediately forwarded to Dr. Vaughan, who replied on Jan. 8, asking for full particulars of the case and stating that there had, already, been found a poisonous germ in the cheese. In response to a request from this office for fuller information, Dr. Morris wrote on Jan. 12, giving fuller information. The letter, copy of which was sent to Dr. Vaughan, on Jan. 13, 1897, was as follows:—

"The details of the cheese poisoning case, so far as I have been able to ascertain are as follows: At 12 o'clock midnight, Dec. 29-30, I was called to John Skedgel's with instructions to 'hurry up' and on reaching the place found the mother and two children sick with nausea and vomiting with intense retching and straining, the substance vomited seemed to be a slimy, tenacious mucus, and blood streaked very profuse, the attacks being from 15 to 20 minutes apart. There was no rise in temperature though pulse was quick, being 130 in the child 3 years and 120 in the child 5 years, both girls.

"On inquiry I found that the father had stopped at Cobb Bros.' grocery on his way home that evening for supper and had purchased a pound or so of cheese that was just cut from a new cheese. Suspecting that the cheese might be the cause of the sickness I called at the grocery got a sample of it and sent to you and ordered the sale of it stopped, but have since learned that a family named Herrick had some of the cheese the same evening and were sick with vomiting and diarrhea. These are all the particulars so far as I know.

"The Skedgel family all ate of the cheese and also a man and wife who were visiting them, none of the others were sick."

In response to a letter from this office of Jan. 13, inquiring the name of the manufacturers of the cheese, Dr. Morris replied that the name of the jobber from whom the cheese was purchased was the Worden Grocer Co., Grand Rapids, and inquiry of them disclosed the fact that the assignment of cheeses, from which the one in question was sold, was manufactured by G. B. Horton, Fruit Ridge, Michigan; that the date of the manufacture of the cheese was Oct. 9, 1896, and that the whole assignment was being held on the instruction of the manufacturer.

January 18, 1897, a letter was sent from this office to Hon. G. B. Horton, the manufacturer of the cheese in question, asking for information relative to the milk, manufacture, etc., of the cheese. The letter was as follows:—

"A sample of cheese sold at Belding, Michigan, by Cobb Bros., caused serious sickness. Some of the cheese was sent to the State Laboratory of Hygiene, and I have received a report that the cheese contains a poisonous germ. In order to study the method of manu-

facture or probable cause of the presence of the germ, I have taken means to trace the origin of the cheese, and learn that it was made Oct. 9, 1896, at one of your factories.

"I write this letter to you to ask that you put me in possession of all the facts which it is practicable to obtain; (1) as to the method of manufacture, whether any exceptional action or circumstance was connected with the manufacture of cheese on that date, (2) whether there was any exceptional source for the milk used for making cheese on that day, (3) whether there was any water from an unusual source used on that date for washing utensils, containers, or anything likely to contaminate the milk or the cheese with the poisonous germ, (4) whether any convalescent from typhoid fever or any other disease had to do with the handling of the milk or curds, (5) whether any exceptional source of dust liable to contain the germ can be traced as present on that day. (6) If there was no unusual water supply I should be glad to know exactly what the usual supply is. I have not yet learned what particular germ it was in the cheese, but we do know that well water is particularly likely to be loaded with bacteria in October, that being the month of lowest water in wells and of greatest sickness from typhoid fever. Undoubtedly well water then contains more of the common bacillus of the intestine than it does at any other time of the year.

I have mentioned only a few of the conditions. It is quite likely you may think of others which might bear on the study. I take it that you are interested in learning the cause because that will enable you to better guard against loss in the future. The interest of this office in the subject is to learn the cause with a view to aiding not only you but all other manufacturers in Michigan to guard against this cause of sickness. If you chance to know the cause I trust you will give me the information."

Mr. Horton replied, Jan. 21, 1897, as follows:—

"Cheese poisoning, so far as its origin is concerned, is still a mystery. Dr. Vaughan succeeded in separating the poison from the cheese, but that is as far as he met with positive results. About ten years ago I had a case of it, as you may remember. The cheese at that time was made at an entirely new factory which was built in Feb. and March and commenced the making of cheese on April 1 of the same year. The factory was located on an open new field at least a hundred rods from any other buildings and on elevated ground from all surroundings. The well was a new one, and every utensil in the factory was new.

"With continuous cheese making at several factories for over thirty years that case and the one now on hand are the only ones experienced. Thus you see it is of very rare occurrence. We are told that it is the same poison that develops in pressed chicken, chicken pie kept over, canned meats, ice cream, etc.

"It comes in the milk in some form and I am inclined to the conclusion that some farm premises have surroundings that contaminate water or that make it possible for the milk that sets in the cans over night at the farm to take up or absorb a poisonous substance. The milk all comes to our factories in the morning about 9 o'clock, and the process of cheese-making is complete before 2.00 P. M. The milk at the factory comes in no contact with water. Steam is applied under the tin vats that contain the milk. The milk all comes from patrons of the factory, who bring their milk daily during the whole season. Water for washing utensils came from the usual source, and is boiled before using. No convalescent from typhoid fever or other sickness in any way about the factory. No such sickness has ever been at or around the factory in my remembrance, so that dust dislodged by unusual jarring or similar cause, could not be the cause. This last October the wells in our section were well supplied with water. At a cheese factory a very *large* quantity of water is used daily which keeps up a good inflow of fresh water which condition is different from a house well where but few pails full are used daily. The poison is called 'Tyrotoxicon'. Dr. Vaughan says that every sample of newly-drawn milk from the udder of the cow, will, if bottled up, tightly as soon as drawn produce the poison. Our milk cans are supposed to be always set with open tops. Some farmers might be careless in this respect, but not very likely, for the milk would show taint in the morning, and thus be rejected at the factory. Tainted milk (as we term it) never makes poisonous cheese, but instead a very gaseous cheese that will not keep. Then again, milk to thus develop tyrotoxicon must be so confined for considerable time past 24 hours. The true origin has never been ascertained."

Jan. 23, 1897, another letter was sent from this office, to Mr. G. B. Horton, asking for further particulars, in the hope of locating definitely the township in which the factory, which supplied this cheese, was located.

and from which the milk used in the manufacture of the cheese was taken. The letter was as follows:—

"Inasmuch as you report that there were no unusual conditions attending the *manufacture* of the cheese on that date. I would be glad to carry the investigation a step further, if that is possible. It seems probable that your view is correct 'that some farm premises has, or had, on that particular date, surroundings that contaminate water or that make it possible for the milk that sets in the cans over night at the farm to take or absorb a poisonous substance.' In this particular instance the 'poisonous substance' is a micro-organism, a so-called 'germ'. It seems to me to be very important to find a source of that microscopic plant which by its reproduction in the milk or cheese causes the cheese to be poisonous. I note what you say in your letter about tyrotoxicon, but, as I wrote you in my former letter, the poison in this instance is a specific germ. 1. I would be glad to have you inform me exactly where the factory is, at which the cheese was made Oct. 9, 1896, which was sold to the Worden Grocer Co. of Grand Rapids, and caused the sickness in Belding.

"2. Kindly write the names of the townships in which the milk was produced which was made into cheese Oct. 9.

"3. Was there included in the milk used Oct. 9, milk from any source not used from on other dates?

"4. If so, I should like to know exactly where that milk was produced and on whose farm?"

"5. If practicable, I wish you would as opportunity offers, endeavor to get answers to the questions in my former letter as to any exceptional sources of dust or water likely to contain a specific germ, at the several farms from which the milk came to your factory Oct. 9.

"* * * * * Tyrotoxicon is a poison, but it is a chemical poison, which can be obtained in crystalline form. The cause of the sickness contained in the cheese made at your factory Oct. 9. is a *specific germ*."

Mr. Horton replied to the above letter January 25, 1897, and said that he was not then able to inform this office as to which township the cheeses were sent from, and that he would have to get from the Worden Grocer Co. the exact date of the shipment, etc.; stating that there had been shipped cheeses from more than one factory, at about the same time, but that the information would be supplied this office at a later date. In concluding his letter Mr. Horton asked for information as follows:—

"You speak of dust, etc., that might develop the poison. Would it be possible for a person coming down with, or recovering from scarlet fever, if allowed to milk a cow, to so affect the milk that *THIS KIND of poison would be developed*, or would it be more likely to cause cases of scarlet fever? The same with typhoid?"

Jan. 28, 1897, a letter was sent from this office in reply to this interesting question as follows:—

"In reply to your question whether it would be possible for a person coming down with or recovering from scarlet fever, if allowed to milk a cow, to so affect the milk that a poison would be developed in the milk.—I think no one can answer that question *positively*, because the germ of scarlet fever has not yet been isolated, with certainty. From what we know of germ diseases, however, this is quite possible, and it is possible that the vomiting and other symptoms might occur without the subsequent development of scarlet fever. This is especially probable if the person taking the milk had previously had scarlet fever. Except that the germ of typhoid fever is probably known, similar remarks apply to typhoid fever as to scarlet fever."

ALLEGED RABIES (HYDROPHOBIA) IN MICHIGAN IN 1896.

During the year ending December 31, 1896, information relative to three alleged outbreaks of rabies were received at the office of the State Board of Health. The substance of the reports presented some interesting facts; but the cases were either not fully investigated, or the biological examinations and subsequent developments did not bear out the reports. The localities from which reports were received were Detroit, one case in man; Chelsea, Washtenaw county, one case in a dog, which bit several others; Lacota, Van Buren county, one case in man, a number of dogs and several cattle. In Coral, Montcalm county, a strange case, which presented the appearance of rabies, was visited by a number of physicians and considerable correspondence relative to it passed between this office and the physician in charge. Some of the reports relative to the case seemed to indicate that the case might have been epilepsy, and not rabies.

The facts relative to these alleged outbreaks, and the opinions concerning the jurisdiction of the local health authorities, etc., will be found in the following correspondence:—

ALLEGED HYDROPHOBIA IN DETROIT.

Feb. 13, 1896, the Detroit Journal contained an article relative to one William Herman, who was affected with what was supposed to be hydrophobia, at the Harper Hospital, in Detroit. The article stated in substance, that in August, 1895, William Herman was bitten between the thumb and the first finger, by a pet cat, with which he was playing. Early in February, 1896, on Sunday, about seven months after the bite, he complained of head-ache and back-ache and on Tuesday was pronounced to be suffering with hydrophobia and was taken to the hospital. Some of the saliva was taken, and it was proposed to inoculate with it some dogs and rabbits.

Feb. 14, 1896, a letter was sent from this office to Samuel P. Duffield, M. D., health officer of the city of Detroit, asking whether the report was correct, and for further information relative to it.

Feb. 17, 1896, a letter was received from Dr. Duffield, a portion of which is as follows:—

"In answer to your inquiry for particulars in the case of hydrophobia. Clinically it had all the symptoms, etc. I saw the case. Bacteriological examinations and cultures are now being made from the spinal cord to substantiate or disprove the clinical diagnosis."

It was afterwards learned that the bacteriological experiments did not succeed, and it was not definitely proved whether or not the case was hydrophobia.

SUSPECTED RABIES IN CHELSEA, WASHTENAW COUNTY.

June 16, 1896, a letter was received at this office from George W. Palmer, M. D., Health Officer of Chelsea Village, in which a suspected case of rabies was reported. The correspondence in this instance serves to show how the local health officer may act to restrict the spread of rabies. Health Officer Palmer's letter is as follows:—

"On Saturday last we had a strange dog come into town from Dexter Tp. frothing at the mouth and showing other symptoms of Rabies by biting at the other dogs. Some he bit and others he tried to bite. He was killed early in the morning but had been in the village half of Friday night, so we do not know how many dogs were bitten. We learned he bit six dogs in Dexter Tp. I called a meeting of the village board and laid the facts before them and they decided to kill all dogs bitten and all other dogs that were not killed to be tied up. The marshal was instructed to kill all dogs found running at large on the streets. Please send us some pamphlets on the subject and law to govern us in the matter as we wish to be as severe and thorough in the matter as the law will allow us."

June 17, 1896, the Secretary of this Board wrote to Dr. Palmer, commending the action of the Chelsea health authorities in the matter and offering further advise relative to the restriction of the animals suspected. The letter was as follows:—

"I think your actions for the restriction of the spread of rabies have been right, and dogs should be secured until after all probable danger. The period of incubation in animals is somewhat uncertain; but, in order to be safe, it would seem that the order of your board relative to liberty of dogs should be continued for at least two months. Dogs suspected of having been bitten should be killed, or securely isolated until all danger has passed, the same should be practiced regarding other animals that may have been bitten. There should be a general order for any person observing strange and unnatural actions in animals to report immediately to the health officer, that prompt measures can be taken to prevent the development or spread of rabies.

"Rabies is a disease dangerous to man as well as animals, and should be promptly restricted and controlled by the local board of health. Your board of health should, under sections 1636 and 1639 Howell's statutes frame and publish rules which would control the action of dogs or other animals, and which would enable the health officer to act promptly in case of any emergency without being delayed by calling the local board together, without such specific rules, the health officer should act under Act 137, Laws of 1882."

ALLEGED RABIES IN LACOTA, GENEVA TP., VAN BUREN COUNTY.

December 26, 1896, a letter was received at this office from N. S. Taylor, health officer of Lacota, Michigan, reporting a suspected outbreak of rabies in which one man, "a number of dogs and several cattle" were bitten. Some of the dogs were killed and others, with cattle, were isolated; and the man who was bitten was sent to Chicago for treatment. The letter also requested that instructions be sent from this office.

Dec. 28, 1896, the secretary of this Board wrote to Health Officer Taylor, in reply to his report of rabies, as follows:—

"This (rabies) is a disease which is dangerous to man as well as animals, and should be promptly stamped out by the local board of health. * * * * * If any animal shows symptoms of rabies, and is not a valuable animal, and is likely to do harm, it should be immediately killed, *unless* it has bitten or possibly infected some human being. If a valuable animal, and does not endanger the lives of other animals and persons, and has not already bitten some person, it might be confined until it is definitely known whether or not it is really rabid. If rabid it will surely die 'within eight days'. If thought to be threatened with rabies it should be securely isolated until after the period of incubation is over, the length of time of which is not certain. Such animals ought to be secured for at least five or six weeks to be on the safe side."

The letter also offered the services of this Board in case it might be required in the instance above mentioned, and requested that further information be sent this office, relative to the development of the suspected cases. No further information, however, reached this office relative to the above-mentioned outbreak.

RABIES (HYDROPHOBIA) IN MICHIGAN FOR THE TEN YEARS, 1887-96.

TABLE.—*Exhibiting the numbers of reported outbreaks, definite and suspected cases, and deaths from rabies, in man and animals, in Michigan, during the ten years 1887-96. (Compiled from reports received at the Office of the Secretary of the State Board of Health.)*

Year.	Definite.							Indefinite or suspected.						
	Outbreaks.	Animals.			Persons.			Outbreaks.	Animals.			Persons.		
		Affected.	Killed.	Died.	Affected.	Died.	Period of Incubation.		Affected.	Killed.	Died.	Affected.	Died.	Period of Incubation.
1887.....	1	1	0	0	1	1	60 days	7	6	1	0	3	1	* 8 years
1888.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1889.....	6	27	8	14	6	1	† 35 days	2	16	15	0	† 1	0	0
1890.....	2	1	1	0	1	1	‡ 20 months	1	2	1	0	0	0	0
1891.....	3	20	1	7	16	0	0	0	2	0	2	0	0	0
1892.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1893.....	7	16	11	0	4	2	* 55 days	1	3	0	0	1	0	0
1894.....	5	23	20	2	1	1	49 days	5	3	1	1	4	2	0
1895.....	2	13	13	0	1	1	46 days	1	1	1	0	1	0	0
1896.....	0	0	0	0	0	0	-----	3	**2	2	0	3	1	7 months

* 1 Female.

† 1 Male.

‡ Treated with a mad stone, result not known to this Office.

§ 1 Case.

|| 1 Case treated at N. Y. Pasteur Institute, result not known to this Office.

** "A number of dogs and several cattle" reported in one locality.

REPORTED RABIES IN CORAL, MONTCALM COUNTY.

March 21, 1896, a letter was received at this office from Dr. J. G. Just, of Coral, Montcalm Co., Mich., concerning an outbreak of what he diagnosed as hydrophobia, in Pierson Township. The length of time over which the case ran, about ten months, would seem to negative the diagnosis;* but the correspondence extending from March 21, 1896, to December 8, and containing about forty-seven pages of MSS., containing the diagnosis of several different physicians, and the opinions of several other persons who saw the case, including the health officer and member of the board of supervisors, and the wide diversity of opinion therein expressed serves to show that under some circumstances, the clinical symptoms of Epilepsy, Spinal fever or Hysteria, may be similar to those of Hydrophobia.

The facts in the case gathered from the letters received at this office, seem, in some details, to conflict, but the data in the main were consistent enough and were substantially as follows:—

August 17, 1895, a boy about 14 years old, was bitten by a dog, which, neither before nor afterwards showed any of the symptoms of rabies.

*"The duration of the disease is somewhat varied, lasting from two to ten days." Paper on Rabies by T. R. MacClure from Proceedings of the Sanitary Convention at Charlotte in 1894.

About March 7, the boy began "barking and snapping" and having such violent convulsions that it sometimes required two or three men to hold him. Prior to this time "for months" he had "an awful bad feeling in back of head" and frequent bleeding at the nose. Some of the letters stated that he had received a blow or a fall which caused an injury to the temporal bone. It also appeared that the dog had bitten other members of the family.

The opinion of the physicians who examined the case are briefly as follows:—

Dr. J. G. Just.—*"I call it spasmodic Hydrophobia."*

Dr. J. T. Kilburn.—*"One physician diagnosed it Spinal Meningitis."*

Dr. Joseph B. Griswold.—*"I had no hesitation in pronouncing the case not Hydrophobia."*

Dr. A. W. Nichols.—*"I consider it a very remarkable case of hysteria or else a slight form of hydrophobia."*

J. R. DeWolf, Health Officer of Pierson Tp.—*"Dr. J. B. Griswold of Grand Rapids pronounced it something other than hydrophobia," also, "Dr. L. S. Griswold of Big Rapids calls it Epilepsy."*

December 9, 1896, the secretary of this Board, in a letter to J. R. De Wolf, the health officer of Pierson Tp., stated the matter from the standpoint of the State Board of Health. A portion of his letter is as follows:—

"From the information which has come to this office, I would think the boy had epilepsy, although he may be 'playing fits'. If he had epilepsy, he should be treated medically or surgically for that trouble. I understand that there is a surgical treatment (trephining) for this disease which might cure the boy. Just where that treatment is best secured, I cannot say; but, if you were to write either to Doctor Charles Nancrede (Surgeon), or Dr. George Dock, (Physician) professors at the University, Ann Arbor, Michigan, I believe you might secure information which might aid you.

"P. S. You might obtain a diagnosis of his case by applying for his admission to the State 'Home for Feeble Minded and Epileptic' at Lapeer, Mich. Apply to Dr. W. A. Polglase, Lapeer."

GLANDERS IN HORSES IN MICHIGAN IN 1896.

During the year ending December 31, 1896, one outbreak of Glanders, in Charlotte, Eaton county; one outbreak in Albert township, Montmorency county; and one outbreak of suspected glanders, in Sylvan township, Osceola county, were reported to this Office. In all instances the disease was in horses. The number of animals affected in the outbreak at Charlotte was not stated in the report. In Sylvan township one horse was suspected of having the disease. In Albert township one horse was affected.

The following extracts from the correspondence of this Office give details relative to the above-mentioned outbreaks of glanders:—

GLANDERS IN CHARLOTTE.

Sept. 7, 1896, F. A. Weaver, M. D., health officer of the city of Charlotte, wrote to the Secretary of this Board as follows:—

"I have been notified of some cases of glanders in this city, in horses belonging to Wm. Boyles and others. I am unable myself to say whether the horses are so infected or not; and our mayor told me to have you send the State Veterinary Surgeon here at once to investigate with me.

"P. S. I have just talked with Dr. Evers, our veterinary surgeon here and he says he diagnosed glanders here in these horses a long time ago."

Sept. 8, 1896, the Secretary replied as follows to Dr. Weaver's letter:—

"Dear Doctor:—Your letter of Sept. 7, relative to glanders is before me, for which please accept cordial thanks. Such cases should also be reported to the State Live Stock Commission, Hon. H. H. Hinds, Stanton, Michigan. However, in this instance I have sent Mr. Hinds a copy of your letter.

"This Office has no jurisdiction over the State Veterinarian; he works under the order of the president of the State Live Stock Commission. I have no doubt president Hinds will give the subject immediate attention as soon as he receives the copy of your letter.

"Glanders is a disease dangerous to the public health, and a disease dangerous to man as well as animals. The disease should be promptly reported to the health officer, and restricted by him in accordance with Act 137, Laws of 1883 (page three of pamphlet sent herewith.) Great care should be taken that the disease is not spread to other animals, and especially not to man. The danger is from the discharges from the nose and throat. Strict isolation of the case should be enforced until the State Veterinarian comes and takes charge of the case. Under no circumstances should the local board of health fail to guard the public health and life from this fearful disease.

"I infer from your letter that there are only the cases in animals, and that the disease has not as yet been spread to human beings. Any further information you may have, or may come to your knowledge concerning this outbreak, I should be glad to have reported to this office. When the outbreak is over I shall send you a printed form for final report."

Oct. 17, 1896, Dr. Weaver again wrote to the Secretary as follows:—

"Those horses which I wrote you about had glanders and have been destroyed. I would like the necessary blanks upon which to make my report and also a blank upon which to make out the accounts for taking care of the animals, killing and burying."

Oct. 19, 1896, in reply to Dr. Weaver's second letter, the Secretary wrote:—

"I send you herewith a blank form for final report.

"Regarding forms for your bills, etc. I do not quite understand what you wish; I think probably that is a subject which would come under the jurisdiction of the local board of health."

SUSPECTED GLANDERS IN SYLVAN TOWNSHIP.

June 8, 1896, Bennett Gregg, health officer of Sylvan township, Osceola county, wrote to this Board as follows:—

"There is a diseased horse here in this town. It is thought by some it has glanders. I had Harold Cook a veterinary surgeon of Ewart examine it. He said he would not say whether it had glanders or not, but it had all symptoms of glanders.

"There has been a good deal of complaint among the neighbors about it.

"I would like to have you advise me what to do, or if you think best to send some one to examine it."

June 10, 1896, the following reply to Mr. Gregg's letter was sent from this Office:—

"Your letter of June 8, relative to a suspected case of glanders in a horse is before me. You should have also notified the President of the State Live Stock Commission. H. H. Hinds, of Stanton, is president. However, in this case I have sent Mr. Hinds a copy of your letter.

"Glanders is a disease dangerous to man as well as animals and the local board of health should not fail to use every effort to restrict the spread of the disease to man or to other animals. The board of health should order this horse isolated until it is proved that the disease it has is not glanders. I presume the State Veterinarian will be sent to investigate. I have no doubt the president of the State Live Stock Commission will take prompt action, but until the case is taken in charge by the State Live Stock Commission or is proved not to be glanders, the local board of health should keep the horse isolated, so there is no danger of the disease spreading. Any infected posts, managers, etc., should so there is no danger of the disease spreading. Any infected posts, managers, etc., should be disinfected, preferably by burning.

"Herewith I send you a pamphlet (No. 120) in which I have marked parts bearing on the subject. I hope you will keep this office informed regarding this case."

GLANDERS IN ALBERT TOWNSHIP, MONTMORENCY COUNTY.

Oct. 5, 1896, H. P. Macklin, M. D., health officer of Albert township, reported as follows to this Office, relative to glanders in his jurisdiction:—

"I have to report a case of glanders which I saw yesterday and had the horse destroyed at once, so imagine there is no danger of that spreading."

ACTINOMYCOSIS (LUMP JAW) IN CATTLE IN MICHIGAN IN 1896.

During the calendar year 1896, actinomycosis was reported present in three localities in Michigan, with eight cases of the disease, distributed as follows:—Conway township, Livingston county, two cases in cows; Whitefish township, Chippewa county, one case in a cow; Caseville township, Huron county, five cases in cattle.

The following extracts from correspondence of this Office give details of the above-mentioned outbreaks of this disease.

LUMP-JAW IN CASEVILLE TOWNSHIP.

Jan. 18, 1896, a resident of Caseville township wrote to the Secretary of this Board as follows:—

"I have been informed and have good reason to believe that W. W. Loocinuse of this town, has now in his barn 4 or 5 head of Lump Jaw cattle, and I believe he will kill same and ship them as there was one delivered to his barn yesterday.

"Will you please look into this at once, as this is not the first time he has done this."

Jan. 20, 1896, the Secretary sent a copy of the last quoted letter to Hon. H. H. Hinds, president of the State Live Stock Commission; and on the same date wrote to Dr. Henry Johnson, health officer of Caseville township, as follows:—

"Complaint reaches this Office that 'W. W. Loocinuse of Caseville has now in his barn four or five head of lump-jaw cattle, and I believe he will kill same and ship them as there was one delivered to his barn yesterday (Jan. 17.)'. It is also alleged that 'this is not the first time he has done this'.

"I have passed this information along to the Hon. H. H. Hinds, president of the State Live Stock Commission, at Stanton, who may consider sending the State Veterinarian.

"Whether in man or animal, any disease dangerous to the public health should be reported to the office of the State Board of Health, and the local authorities should not fail to guard the public health and life against such a dangerous communicable disease. I understand that this disease is dangerous to man, conveyed to man by eating of the diseased meat. As the disease is a specific parasitical disease, great care should be taken that it does not spread. I would not believe it safe to use the milk from an infected cow.

"Section 224 Howell's Statutes provides a penalty for any person knowingly selling 'milk, the product of a sick or diseased animal or animals'. Section 3316 Howell's Statutes provides a penalty 'If any person shall knowingly sell any kind of diseased, corrupted, or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer.'

"I send you herewith a copy of our pamphlet on the work of health officers, etc., in which I have marked parts bearing on the duty of the health officer, and of the local board in connection with actinomycosis (lump-jaw) or other disease of animals which is dangerous to man or to other animals. The local board of health should take the cases in charge until relieved by the State Live Stock Commission or its representative.

"If your local board of health have not done so, they should, under sections 1636 and 1639 Howell's Statutes, make and publish rules which shall enable the health officer to act immediately on the occurrence of a case of glanders or such disease dangerous to the public health, without having to wait until the board can meet."

Jan. 20, 1896, the Secretary wrote also to Hiram L. Chipman, prosecuting attorney of Huron county, as follows:—

"The following is a copy of a letter received at this office this morning, dated Jan. 18, 1896:—I have been informed and have good reason to believe that W. W. Loocinuse of this town has now in his barn four or five head of lump-jaw cattle, and I believe he will kill and ship them as there was one delivered to his barn yesterday. Will you please look into this at once, as this is not the first time he has done this."

"I have written Dr. Henry Johnson, health officer of the township of Caseville, requesting him to take prompt action for the restriction of the disease, and calling his attention to sections 2244 and 9316 which provide a penalty for the sale of diseased meat and the sale of milk from a diseased animal."

"Lumpy-jaw (actinomycosis) is a specific parasitical disease which is dangerous to both man and animals, and should be promptly restricted and regulated. The disease is conveyed to man most generally by eating the meat from diseased animals, and I believe that the milk from an infected cow must be dangerous to the health of those using it."

"Is there not some way under section 2244 or 9316 Howell's Statutes or some other sections of law, by which this man can be prevented from disposing of these animals, and prevent him from further continuance of such practices?"

"I hope the subject will receive your immediate attention."

In reply to the Secretary's letter, Jan. 21, 1896, Mr. Chipman wrote:—

"Yours of the 20th received. There does not seem to be any statute regulating the matter of lumpy-jaw in cattle. Section 2244 Howell does not apply. If any one should sell lumpy-jaw cattle for provision to be eaten, and knew they were so affected and they also knew that such meat was dangerous to health, section 9316 would apply. I have notified Dr. Johnson of Caseville to investigate and report. I cannot do much without evidence. Your informant should have come to me, so that I might get at the facts.
* * * * * I have also notified the Sheriff to investigate."

ACTINOMYCOSIS IN CONWAY TOWNSHIP.

Sept. 19, 1896, W. H. Billings, a resident and ex-health officer of Conway township, Livingston county, wrote to this Office as follows, relative to lump-jaw in that township:—

"There is a man here who has two cows that have what is called lump-jaw. Is there any cure for them, and what course shall he take? He is a poor man and can't afford to lose them for nothing. There are three lumps on the jaw and neck. Does the State compel that such cattle be killed, and does the State Veterinarian have to come and look after them? Will you let me know what to do in the matter?"

Sept. 21, 1896, the Secretary replied to Mr. Billings' letter giving him the information asked for; and instructions and suggestions substantially the same as those contained in the letter to Dr. Johnson, health officer of Caseville township, above quoted in this article.

On the same date (Sept. 21) copy of Mr. Billings' letter was sent from this Office, to Hon. H. H. Hinds, president of the State Live Stock Commission.

ACTINOMYCOSIS IN WHITEFISH TOWNSHIP.

June 6, 1896, R. F. Endress, health officer of Whitefish township, Chipewa county, wrote to the Secretary of this Board as follows, relative to lump-jaw in his jurisdiction:—

"Kindly give me your advice on the following: One of the farmers here has a lumpy-jaw cow; he is milking her but what he does with the milk I cannot say.

"Is it necessary to call in a veterinary surgeon and have him give his opinion or not?

"Kindly send instructions and oblige."

June 10, 1896, replying to Mr. Endress' letter the Secretary wrote:—

"Replying to your letter of June 6, just received, relative to a case of actinomycosis (lump-jaw), I think it would be well, if the State Live Stock Commission do not send the State Veterinarian, to call in a local veterinary surgeon.

"Whether in man or animals, any dangerous communicable disease, should be reported to the health officer and he and the local board of health should take prompt action for the restriction of the spread of the disease.

"I understand that this disease is dangerous to man as well as animals, conveyed by eating the diseased meat, etc. As the disease is a specific parasitical disease, great care should be taken that it does not spread. I would not believe it safe to use the milk from an infected cow. Sec. 224 Howell's statutes provides a penalty for any person knowingly selling 'milk, the product of a sick or diseased animal or animals.' Sec. 9316 provides a penalty 'If any person shall knowingly sell any kind of diseased, corrupted, or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer.'

"When diseases of this kind occur in animals it is the duty of the health officer to notify the president of the State Live Stock Commission, Hon. H. H. Hinds, of Stanton, Michigan. However, in this case I have sent a copy of your letter to Mr. Hinds."

FATALITY AMONG HOGS IN MICHIGAN IN 1896.

During the year ending Dec. 31, 1896, the presence of a fatal disease among hogs (probably hog-cholera) was reported in three localities in Michigan as follows:—In Fraser township, Bay county, with 15 deaths; Medina township, Lenawee county, with 13 deaths; in the vicinity of Coldwater city with 40 deaths.

In reporting to this Office relative to this disease, T. J. Turner, M. D., the health officer of Coldwater city, wrote:—

"I have hearsay evidence of the death of over 100 additional to the 40. As to the disposition of the carcasses of the animals I have no information, but if buried, their decomposition must seriously affect the ground water from which many houses secure their potable water."

Nov. 24, 1896, in replying to Dr. Turner's letter the Secretary of this Board wrote:—

"Please accept cordial thanks for your letter of Nov. 1, relative to diphtheria and hog cholera. There is considerable hog cholera about the State. I shall be glad to have any additional information you may at any time have on the hog cholera outbreak. We would like to make a study of the subject, for its possible relation to a similar disease in the human family."

SUSPECTED HOG CHOLERA IN MEDINA TOWNSHIP.

Relative to this outbreak, J. M. Willis, a resident of Medina township, wrote to the Secretary, Dec. 31, 1896, as follows:—

"My neighbor has lost seven hogs since Sept. and he calls it lung fever. We have lost six and have one sick now. I think it must be cholera. I think there should be something done to stop its spreading. What can be done? Or is there no one here to look after these things?"

On receipt of Mr. Willis' letter, the Secretary wrote as follows to Dr. C. M. Coffin, health officer of Medina township:—

"J. McGrillis or McWillis, of Medina township, $3\frac{1}{2}$ miles west of Morenci, reports to me that his hogs are suffering with what is suspected to be hog-cholera. He has already lost six, and that his neighbor has lost seven.

"Act 125, laws of 1889, makes it the duty of the local board of health of which you are the executive officer, to immediately investigate and take prompt action for the restriction and prevention of the disease. You should take charge of the outbreak until such time as the State Live Stock Commission may relieve you. I have written Hon. H. H. Hinds, president of the State Live Stock Commission, Stanton, Michigan, but it is the duty of the board of health, under the above-mentioned act, to report all action to that commission.

"Hog-cholera is easily communicated, and the animals should be thoroughly isolated from other animals and persons except possibly the keeper. The contagion might be carried on the shoes of a person, from the sick to well animals."

FATALITY AMONG HOGS IN FRASER TOWNSHIP.

Information relative to this outbreak was received at this Office from the following news item which appeared in the "Detroit Evening News" of May 27, 1896:—

"Michie, Mich., May 27.—A strange and fatal disease prevails among the hogs in this vicinity. Frank Wright has lost 11. Dell Bliss has 4 likely to die. The disease is not cholera."

May 28, 1896, the Secretary wrote to Dr. N. Dubeau, health officer of Fraser township, as follows:—

"The Detroit Evening News of May 27, 1896, contains the following:—

After quoting the above news item the Secretary continues:—

"I would like to have you inform me in what township or townships the disease is and all other information relative to it that you are able to give. It should be reported to Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Mich., in accordance with sections 5 and 6 of Act 125, laws of 1889.

"P. S. I would like to know what the disease is. Also whether any person has a disease which has been spread to the hogs by discharges or otherwise. Also whether any person has contracted any disease from the hogs."

Dr. Dubeau did not reply to the Secretary's letter.

SUSPECTED POISONING BY PRESSED BEEF.

The Flint Evening Journal of Sept. 16, 1896, contained the following news item:—

"Henry Haskins, wife, and five children, who live on Northern Wagon Road, in the Fourth ward, were poisoned last night, it is believed, by eating some pressed beef purchased from an East Kearsley street meat market. The family was taken very ill about 9 p. m., and at 9:30 Dr. Shank was summoned. The doctor remained with the afflicted family till two o'clock this morning and left them out of danger. One or two members of the family, who did not eat the meat, were not ill. The family is in a fair way to recovery but are all very weak today."

The above-quoted item having come to the knowledge of the Secretary of this Board, he wrote, Sept. 19, to N. Bates, M. D., health officer of Flint, asking for further information on this subject. In reply, Sept. 21, Dr. Bates wrote as follows:—

"Yours of the 19th received, and I ascertained the following facts from Henry Haskins. He said on the 15th of September the family, consisting of ten members, ate their supper about half-past six o'clock. About 9 o'clock his mother had chills, prostration and excessive vomiting. Then followed the others, himself and five children. All had rigors, retching and vomiting. They attributed their sickness to eating pressed meat bought of a local dealer. Eight of the family ate of the meat, seven of them were sick, one not. Two of the family did not eat of the meat and were not sick. All of the sick recovered within 48 hours. Am unable to procure sample for analysis."

MEAT SUSPECTED OF BEING DISEASED.

DISEASED PORK IN RICHLAND TOWNSHIP.

Jan. 15, 1896, James McLean, member of the township board of Richland township, Saginaw county, wrote to this Office as follows relative to diseased pork in that township:—

"J. Doyle of this township killed two large hogs for their own use. Pork looked nice when killed. It has been killed two weeks and salted two days after killed. On commencing to use it lately it is thickly covered with dark red spots. It does not smell right or taste right. Mr. Doyle applied to me to know if we could ascertain what it was that ailed the pork. I told him that we had better write to you and it might be you would like to have some sent to you for examination. Write immediately and tell me what you think of this case."

Jan. 16, 1896, in reply to Mr. McLean's letter, the Secretary of this Board wrote:—

"Replying to your letter of Jan. 15, relative to suspected pork, this office has neither facilities nor appropriation for making such examination, although the legislature has several times been requested to make a small appropriation for this purpose.

"Examination of suspected meat can be secured at the State Laboratory of Hygiene, at Ann Arbor, for cost. I would suggest, however, that you correspond with Doctor V. C. Vaughan, director of the laboratory, before sending samples.

"P. S. If the pork is 'measley', it must be thoroughly cooked or those who eat it are liable to be infected with tapeworms."

SUSPECTED DISEASED BEEF, AT SUTTON'S BAY.

Nov. 14, 1896, Dr. W. M. Payne, of Sutton's Bay, Leelanau county, wrote as follows to the Secretary of this Board relative to beef supposed to be diseased:—

"I have by this mail forwarded to you a sample of beef and tissue taken from an animal slaughtered here yesterday. You will find a small encysted body therein. What are they? Supposed to be diseased. Sample is from tissue surrounding gullet. Let me hear from you at early date stating if the beef should or should not be used and oblige."

Nov. 16, the Secretary sent a copy of Dr. Payne's letter and the sample of beef therein mentioned, to Dr. V. C. Vaughan, Director of the State Laboratory of Hygiene, Ann Arbor, and at the same time wrote to Dr. Vaughan:—

"As this Office has no facilities for complying with Dr. Payne's request, I hope you will do so. If convenient I shall be glad to know the result of any examination you may make."

Nov. 24, 1896, the Secretary received the following letter from Dr. Vaughan:—

"I examined the parasites found in the gullet and tissue sent to me from W. M. Payne, M. D., of Sutton's Bay, Michigan, and thought at first that they were flukes, but they are not. They are evidently larval forms of some kind of fly, either the gad-fly or the warble fly. I have turned over the parasites to Dr. McMurrich, who is an authority upon the subject, and when he determines definitely what they are, he or I will let you know. There is no reason why the meat should not be eaten, if well cooked."

Nov. 25, 1896, the Secretary sent Dr. Payne a copy of Dr. Vaughan's letter, above quoted.

DISEASED COW SOLD FOR BEEF IN LANSING.

Dec. 29, 1896, a resident of Lansing called at this Office and stated that he had good reason to believe that a diseased cow had been killed and was then hanging in a certain meat market for sale. He wished to know what could be done. The law relating to this subject was read to him; and he was told that the Dairy and Food Commissioner had direct jurisdiction in such cases. Mr. Storrs, Dairy and Food Commissioner, was asked by telephone from this Office what he would do in the case and he replied that he would immediately investigate and if found necessary would prosecute.

Dec. 30, 1896, Mr. Storrs telephoned to this Office stating that he had visited the meat market indicated, and had found the beef in question; but as the owner of the market was about to return the beef, he thought that was the best he could do at present, but would follow the beef and see that it was not sold to other persons.

PEACH YELLOWS.

Aug. 26, 1896, Dr. William M. Ikeler, health officer of Three Rivers city, St. Joseph county, wrote to the Secretary of this Board as follows relative to peach yellows in his jurisdiction:—

"It is a question among us here whether we are eating fruit infected with yellows. By express I send samples. Please inform me early."

In reply to Dr. Ikeler's letter, Aug. 28, 1896, the Secretary wrote:—

"Your postal card of August 26, was received yesterday and the package of peaches was received this morning. The germ that causes peach yellows has not yet been identified, and I know of no way to tell you whether the peaches you send are affected. I telephoned the State Dairy and Food Commissioner, and he knew of no way. I endeavored to communicate with Prof. Wheeler at the Agricultural College, but he was out of town; I was also unable to reach Prof. Beale. If I find out anything which would be of interest to you, I will write."

SOAP SUSPECTED OF BEING POISONOUS.

Nov. 21, 1896, Mrs. J. M. Beedle of Vicksburg, Kalamazoo county, wrote to this Office as follows:—

"I write to know if there is anything poisonous in the sample of 'Witch Hazel Soap' which I send you. I was poisoned by something and think it was this soap, but have no proof of it. Please examine it and oblige."

Nov. 24, the sample of soap mentioned by Mrs. Beedle and copy of her letter relative thereto, were sent by the Secretary of this Board to Hon. Charles E. Storrs, Dairy and Food Commissioner, for examination.

Nov. 25, the following letter was addressed to Mrs. Beedle, by W. L. Rossman, State Analyst:—

"Dr. H. B. Baker, Sec'y of State Board of Health, referred the sample of soap to me for examination. The soap was found to contain no metallic impurities, and when used freely on the hands produced no ill effect. The difficulty referred to must have been produced by something else."

TUBERCULOSIS IN CATTLE IN MICHIGAN IN 1896.

During the calendar year 1896, information was received at the office of the State Board of Health of the presence of tuberculosis in cattle in eight localities in Michigan.

The following extracts from correspondence of this office give details of action by the Secretary of this Board and others relative to the several reported instances of this disease:—

TUBERCULOUS COWS IN CALEDONIA TOWNSHIP.

Feb. 12, 1896, G. R. Greckon, M. D., health officer of Caledonia township, Kent county, wrote to the Secretary of this Board as follows relative to tuberculosis in cows in his jurisdiction:—

"We had a case of a beef cow killed for beef which showed she had Tuberculosis, and we had her destroyed. I ordered Dr. Clerk, a competent V. S., to examine the balance of the herd. I went with him today and found five cows with a temperature F. 102 3/5, 102 1/4, 102 and so on down to 100°. I have ordered the milk boiled, etc.

"Let me know the Law in regard to such cases."

Feb. 13, 1896, replying to Dr. Breckon's letter, the Secretary wrote:—

"Replying to your letter of Feb. 12, the subject of dangerous diseases in animals should also be reported to the President of the State Live Stock Commission—Hon. H. H. Hinds, Stanton, Michigan. However, in this instance I have copied your letter and sent the copy to Mr. Hinds. He will probably correspond with you on the questions you ask. This is a question of law which can be better answered by Mr. Hinds. With regard to your authority in killing the cow, and with regard to the rest of the herd, I am not quite certain. Section 2244 Howell's provides a fine and imprisonment for any person knowingly to sell milk from a sick or diseased animal. If this law is violated by any person you should report the violation to the supervisor whose duty it is to prosecute; he can ask the assistance of the prosecuting attorney. I think your recommendation regarding the boiling of the milk a good one.

"If this office can be of further service to you, it will give me pleasure."

TUBERCULOSIS IN COWS AT THE STATE HOME FOR THE FEEBLE MINDED AT LAPEER.

The following news item appeared in the "Detroit Evening News" of Feb. 21, 1896:—

"LAPEER, Mich., Feb. 21.—Eleven Holstein cows bought from a New York stock-breeder for the feeble-minded asylum, have been condemned for tuberculosis. The state live stock sanitary commission, with Gov. Rich and State Veterinary Grange inspected the herd yesterday.

"The animals appeared unhealthy from the moment they arrived, and when one of them was killed yesterday, the suspicion of tuberculosis was verified."

TUBERCULOSIS IN FINE CATTLE IN ALPENA COUNTY.

The "Detroit Evening News" of May 16, 1896, contained the following paragraph:—

"ALPENA, Mich., May 16.—Tuberculosis has been discovered in the thoroughbred Jersey yards of E. O. Avery and other fine herds in this county. Several sick animals have been killed."

May 26, 1896, the Secretary of this Board wrote as follows, to A. M. Miller, M. D., health officer of Alpena city, for further information on this subject:—

"In the 'Detroit Evening News' of May 16, appears the following item:—

After quoting the above item, the Secretary continues:—

"I shall be glad to get all the facts I can regarding this outbreak in cattle, how many cases, probable sources of contagion, *whether cases of human tuberculosis can be traced to infection from this or any other herd*, the disposition of the milk, and any other facts of interest.

"If this outbreak should happen to be in your jurisdiction, I wish you would give me as complete information as practicable. If not in your jurisdiction, I wish you would ascertain in just what townships or villages in your county, tuberculosis has been found, that I may write the health officers of those jurisdictions for information. If you can add anything to the above newspaper clipping, I shall be glad, even if the disease is not in your jurisdiction."

In reply to the Secretary's letter, May 26, Dr. Miller wrote as follows:—

"Yours received today. It is true that we discovered tuberculosis in two herds of Jersey cattle here in Alpena county. As soon as I determined the fact I reported it to 'the State Live-Stock Sanitary Commission' and they came on at once bringing the State Veterinarian along with them.

"First we visited E. O. Avery's fine herd of 27 Jersey cattle where the Veterinarian applied the Tuberculin test and got a marked reaction in 10 instances. They were at once quarantined until they could give them further attention.

"Afterwards, under the supervision of the commission, we killed five of the ten condemned, finding marked tuberculosis in every case. Before this the local board of health had killed three, for Mr. Avery, and one had died of the disease, so that out of a total of 30 head, 1 died, 3 killed by local board of health, 5 killed by the Commission and 5 are still in quarantine to await the further action of the Live-Stock Commission.

"The same test was applied to the Jersey herd of 26 cattle at the Churchill farm, and 9 were condemned. Two of these were killed and the disease well marked, while the other seven are quarantined by order of the Commission.

"Mr. Churchill had one die this spring of a fully-developed case of tuberculosis, so that he lost 1 by disease, 2 killed by the Commission and 7 now condemned and in quarantine.

"The germ of tuberculosis was found in every one of those that died as well as in those we killed. The germ was found positively in the milk of one case where there was tubercular disease of the udder, and not so positively found in one other case. Out of the total of eleven dead cattle, 1 had tuberculosis of the diaphragm, 1 of the bowels and liver, 5 of the lungs and adjacent glands (bronchial, etc.) and 4 general tuberculosis. One had the disease in the udder proven by the microscope, while another certainly looked like it altho' not investigated further.

"Among the interesting things developed during this investigation may be noted the following:—

"The apparent infallibility of the test of tuberculin in diagnosing the disease in cattle that were declared by competent judges to be perfectly healthy—17 of the 19 condemned were as nice-looking cattle as you could wish to see.

"In two instances the disease was found in calves two months old, one of these being the case where the diaphragm alone was affected. Pretty good evidence was deduced that it was communicated from the mother to these two calves through the milk.

"The calf of the cow that died of the disease was found diseased. Another calf of the same age, from a cow that was proven to be healthy, was put with the above calf to suck the same cow that afterward died, also was proven to have the disease, and it was the calf which had tuberculosis of the diaphragm, being pretty good evidence that it contracted it through its food.

"There is apparently no evidence where the disease came from in either herd.

"The butter and milk have been used by the public from both these herds up to about two weeks ago.

"No cases of human tuberculosis can yet be ascribed to the use of the butter or milk, but I am keeping a sharp look out for it.

"The milk and butter of the cattle in quarantine have been forbidden the market.

"The Live-Stock Commission stated that they would send a man on here later to look after those quarantined, as they wished to keep them under observation for a while.

"If there are any more facts that you wish to know I will gladly furnish them."

Oct. 27, 1896, E. O. Avery, owner of one of the above-mentioned herds. wrote to the Secretary as follows:—

"I have killed of the cattle condemned by the State Veterinary Surgeon, Nos. 1, 5, 6, 15, 17."

TUBERCULOSIS IN CATTLE AT THE AGRICULTURAL COLLEGE.

In the "Detroit Evening News" of April 6, 1896, there appeared the following news item:—

"Agricultural College, Mich., April 6.—The tuberculin test was recently applied to the 52 cattle at the college, and as a result eight were found to be affected by tuberculosis—one Jersey, one Holstein, three short-horns, two Guernseys and the only Polled Angus on the farm. The Brown Swiss and Herefords all escaped.

"The result of the test was a great surprise, as nothing about the animals indicated disease. The condemned animals will be isolated and experimented upon before being killed."

The following letter dated April 10, 1896, was received by the Secretary of this Board from John E. Irwin, Grass Lake:—

"My younger son, Max H. Irwin, is at the M. A. C. and writes me today that he is caring for the tuberculous cattle at the College. My wife and I are somewhat disquieted about it but do not wish to disturb him if he is in no danger. What ought I to do about it? Can he milk half a dozen tuberculous cows and care for them without danger of contracting disease?"

In reply to Mr. Irwin's letter, April 13, 1896, the Secretary wrote:—

"I have written the president of the State Agricultural College for information regarding the conditions under which the tuberculous cows are being kept, in order to find out what danger your son, or any other person, is in when caring for the same. I will let you know later, if I can learn the facts."

On the same date, April 13, the Secretary wrote to J. L. Snyder, President of the Agricultural College, as follows:—

"Inquiries are being received at this Office from parents of students attending the college, relative to the cows affected with tuberculosis. I should like to know just what is being done with those animals. How they are cared for? Whether they are being milked, and if so what is being done with the milk? Also any other facts bearing either directly or indirectly upon the subject. The favor of a reply is solicited."

In reply to the Secretary's letter, President Snyder forwarded to this Office the following letter from Prof. Clinton Smith of the Agricultural College. This letter is addressed to President Snyder:—

"In regard to the cattle recently condemned by Dr. Grange and concerning which some question has arisen, permit me to report as follows:—

"As soon as the test was completed and the results known not only was every animal which gave a decided reaction separated from the herd and isolated under the charge of a keeper who never visits the stables or yards of the main herd, but every suspected

animal, every cow which showed the slightest rise in temperature, was also placed in a barn at some distance from the general herd. The latter class of animals will be again tested after the lapse of a couple of months from the first injection. Every possible precaution, reasonable and unreasonable, is taken to prevent any communication between the diseased animals and the healthy herd.

"As to the milk of the tuberculous cows, it is enough to say that it is never removed from the barn where the cows are except for experimental purposes and could not under any circumstances be mixed with the herd milk or offered to any one for consumption. Here too, the close personal supervision of Dr. Grange prevents any danger."

On receipt of the last quoted letter, the Secretary wrote to Prof. Clinton Smith as follows:—

"Your letter of April 14, relative to tuberculosis in the herd at the College, addressed to President Snyder, has been forwarded to me, for which please accept cordial thanks. Also accept my thanks for a copy of the pamphlet by J. H. Monrad on Pasteurization and Milk Preservation. I am very glad indeed to have this pamphlet. * * *

"From what I saw of the interior of the cow which we examined a few days ago, I think she must have contracted the intestinal disease quite recently. And if the exceedingly numerous* tubercles in the intestines are due to the bacillus tuberculosis, the focal discharges of the animal must contain millions of the bacilli, possibly also millions of the spores. If a tuberculous cow or other animal is turned loose in an enclosure where it can eat fodder or grass contaminated by the discharges of such an animal as that cow is believed to have been, it seems to me certain that any animal eating such fodder will be thoroughly infected throughout in a very short time.† This leads me to suggest that the manure from any tuberculous animal, if spread upon the pasture might widely spread the disease. Probably also the disease might be spread from the stalls where the infected animals had been.

"Your letter did not make any mention of what had been done for the disinfection of the stalls, stables, and yards, and what disposition had been made of the manure.

"You say the milk of the tuberculous cows is never removed from the barn, except for experimental purposes. If there are any tubercle bacilli or spores in the milk and the milk is thrown out without disinfection, the dried germs of the disease would soon be very prevalent. It was with reference to the possibility of students who use milk and those who care for the animals, being infected by inhaling the bacilli, that I wrote before.

"It seems to me that tuberculosis having reappeared at the college more than once, would suggest that probably the infection of the disease has been there continuously, and that extraordinary care should be taken for the disinfection of all infected material. Having in mind both human beings and animals.

"I shall be glad to hear from you again on this subject."

April 18, 1896, in reply to the Secretary's letter, Prof. Smith wrote:—

"Your letter of 17th inst. is at hand. In my researches on tuberculosis I have found two or three cases where healthy animals have been supposed to contract the disease from the focal matters of diseased animals. We have therefore been on the alert to prevent this very thing in the present case by isolating the manure of the affected animals. It is not burned but will be hauled to a distant field and will be plowed under. No opportunity is allowed for one animal to eat fodder contaminated either by the breath or discharges of a sick one.

"As I told you when you were here the stalls in which these animals formerly stood have been thoroughly disinfected.

"I am writing in the absence of Dr. Grange who has the control of the sanitary conditions of the diseased cows. I will refer your letter to him for further reply."

SUSPECTED TUBERCULOSIS IN MONROE CITY.

June 27, 1896, Charles T. Southworth, M. D., health officer of Monroe city, wrote to the Secretary of this Board as follows relative to suspected tuberculosis in a cow in his jurisdiction:—

*Hundreds, probably thousands.

†This cow was in such a small inclosure; and I noted that the cow, "Rosa Bonheur," was in such an enclosure and was eating fodder, some of which might easily have contained the *Bacillus Tuberculosis*. At least it was not in any manger or protected place. H. B. B.

"How does tuberculosis first show itself in cows? We have no veterinary of any account here. In one of my families is a Jersey cow that has a cough. The milk and cream are very rich and sweet, and cow in apparently good condition, but the cough in a Jersey makes me suspicious. Is there any charge if the State Veterinarian should come here and examine said cow, if so how much? The family hate terribly to think of such a thing; but do not want a consumptive cow either. I have told them that they can afford to kill her rather than have consumption themselves. Please let me hear from you."

June 29, the Secretary replied to Dr. Southworth's letter as follows:—

"Relative to tuberculosis in animals, if you think you have a case I would suggest that you correspond with the President of the State Live Stock Commission, Hon. H. H. Hinds, of Stanton, Michigan. In this way I think you might secure a visit from the State Veterinarian, who would probably use the tuberculin test; and, if tuberculosis was found, the animal would probably be killed. There would probably be no charge for the visit of the State Veterinarian, and the owner would receive no pay for the animal."

TUBERCULOSIS IN COWS, IN MONITOR TOWNSHIP.

The following item appeared in the "Midland Republican" of Oct. 30, 1896:—

"Five cows on David Wilcox's farm near Bay City, afflicted with tuberculosis, were killed by order of the State Veterinarian."

Nov. 2, the Secretary of this Board wrote to the health officer of Bay City for information as to the township in which Mr. Wilcox's farm was situated, and thus learned that it was in Monitor township.

Nov. 9, the Secretary wrote to the health officer of Monitor township for further information relative to this outbreak.

Nov. 30, in response to the Secretary's letter, P. J. McGrath, health officer of Monitor township, wrote as follows:—

"Your inquiry at hand. Would say with regard to that case of tuberculosis in cattle at the Wilcox farm, I was not notified of same, nor can I get any more information than that they were killed. Have not seen or heard of any spread of same."

SUSPECTED TUBERCULOSIS IN A COW, IN ADDISON VILLAGE.

Dec. 14, 1896, Geo. W. Jackson, a resident of Addison village, Lenawee county, wrote to the Secretary of this Board substantially as follows:—

"My cow has had a bad cough this last summer and commenced to fall away in flesh in August; but much faster since she came in, about Sept. 10. I am told she has tuberculosis, and if you send the State Veterinarian, I think you will find more. If you wish to see my cow you will do well to come soon for she is very bad."

In reply to Mr. Jackson's letter, Dec. 16, 1896, the Secretary wrote as follows:—

"Your letter of Dec. 14, relative to sickness of your cow, is before me. I thank you for the information. The State Veterinarian does not work under the direction of this Board; he works under the direction of the State Live Stock Commission, of which Hon. H. H. Hinds of Stanton, Michigan, is president. I have made a copy of your letter and this morning forward it to Mr. Hinds."

SUSPECTED TUBERCULOSIS IN A COW, IN HOME TOWNSHIP.

May 27, 1896, John S. Rowland, a resident of Home township, Montcalm county, wrote to this Board as follows:—

"I have a cow which presents mysterious symptoms, and I was fearful of tuberculosis or some similar disease. The cow does not eat much, is bloated, coughs, acts stupid and does not chew her cud very much. If I have not presented this to the proper

persons will you please tell me what steps to take that I may find out for a certainty whether the cow has any dangerous disease or not. I had a cow die last fall which acted about the same. Please let me know what steps to take right away."

In reply to Mr. Rowland's letter, May 28, the Secretary wrote:—

"Your letter of May 27, relative to a diseased cow is before me, for which please accept thanks. You should report the case to Hon. H. H. Hinds, President of the State Live Stock Sanitary Commission. This is required by sections 5 and 6, Act 125, laws of 1889. The address of Mr. Hinds is Stanton, Mich.

"Relative to the cow which died I would like to receive a full statement from you relative to whether the cow *was attended by any person who had a cough* and was in the habit of spitting upon the hay or around the stable where the cow was kept; also whether the cow was away from your place for a time, or whether she was raised upon your place and remained there. Please make a full statement and answer all the questions you can upon the enclosed blank, that will bear upon the subject.

"Relative to the cow that is now sick, have you kept her in the same stable, in which you kept the cow which died, or has she been away from your place? Was there any disinfection of stable or stall used by the cow that died? Please make a full statement as to whether any person has had the care of the cow now sick, who has a cough and has been in the habit of spitting around the stable, or upon any of the food given to the cow."

INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO HAVE BEEN CAUSED BY THE USE OF KEROSENE, IN MICHIGAN, DURING THE YEAR END- ING DECEMBER 31, 1896.

Continuing a practice pursued in previous years, the office of the Secretary of the State Board of Health, has, during the year 1896, sought to obtain information relative to each casualty, alleged to have been caused by the use of kerosene, which came to the notice of said office.

The principal sources from which this office obtains facts in regard to such casualties as above mentioned, are four, viz.: from reports by the Fire Marshal of Detroit, State Inspectors and Deputy Inspectors of Illuminating Oils, Local Health Officers, and from newspaper reports. Relative to the last of these sources of information, it should be stated that the Secretary of this Board does not accept as necessarily authentic, newspaper reports of casualties from the use of kerosene. When such reports come to his knowledge, he applies to the proper officials of the localities in which they are said to have occurred, for confirmation or contradiction of the reports, and for any information which these officials may be able to give in connection with the alleged casualties. A copy of the form of letter used on such occasions, is given in the Annual Report of this Board for the year 1892, page 334. The data collected from these sources show that during the year 1896, information was received at this office, of the occurrence of 59 casualties consequent on the use of kerosene in Michigan. These casualties were reported to have occurred in 13 localities, causing loss of 3 lives, injury (non-fatal) to 1 person, and damage of property to the amount of \$17,756.

This reported damage does not include all the actual pecuniary loss occasioned by the above-mentioned casualties, because in some instances where houses, barns and other property were destroyed the loss was not reported.

TABLE 1.—*Casualties in Michigan during the year 1896, believed to have been consequent on the use of Kerosene, information of which was received at the Office of the Secretary of the State Board of Health. In this year the legal test was a Flash Test of 120° Fah., in a Foster Automatic Tester.**

	Number of Casualties.	Number of Localities.	Pecuniary losses, Dollars.	Lives lost.	Persons injured (not fatally).
In Detroit.....	47	1	17,266	0	0
In State (Outside Detroit)	12	12	490	3	1
Totals	59	13	17,756	3	1

*In 1893, the legal test of kerosene, for illuminating purposes, was, by legislative enactment (Section 2, Act 94, Public Acts of 1893) made as follows: "It shall be the duty of the inspector and his deputies to provide themselves at their own expense with the necessary instruments and apparatus for testing the quality of said illuminating oils, and when called upon for that purpose to promptly inspect all oils hereinbefore mentioned, and to reject for illuminating purposes all oils which will emit a combustible vapor at a temperature of one hundred and twenty degrees of Fahrenheit's thermometer. *Provided*, The quantity of oil used in the flash test shall not be less than half pint. The oil tester adopted shall be the Foster automatic tester cup, with the lighted wick placed inside the tube, and under the thimble which shall be used by the inspector and his deputies." Act 94 became operative July 1, 1893.

Casualties from the Use of Kerosene in 1896 Compared with Previous Years.

TABLE 2.—*Exhibiting the number of casualties believed to have been consequent on the use of Kerosene in Michigan (including the city of Detroit), information of which was received at the office of the Secretary of the State Board of Health in each of the eight years, 1889–1896. The legal test of Kerosene in each year is explained in the *footnote to this Table.*

Year.	Number of Casualties.	Amount of damage done, Dollars.	Number of Lives lost.	Number of Casualties caused by Lamp explosions.	Number of Casualties caused by Stove explosions.
1889	53	174,049	8	16	2
1890	55	18,282	2	22	6
First six months of 1891.....	30	10,778	2	19	2
Last six months of 1891.....	118	42,050	9	74	6
Total for the year 1891.....	148	52,828	11	93	8
1892.....	134	66,106	7	75	17
First six months of 1893.....	43	25,958	0	21	10
Last six months of 1893.....	40	23,542	2	22	5
Total for the year 1893.....	83	49,500	2	43	15
1894.....	64	20,374	9	29	1
1895.....	44	28,121	1	18	0
1896.....	59	17,756	3	33	1

*In the years 1889, 1890, and the first half of 1891, the legal test was a Flash test at 120 degrees Fah., in a closed tester; and in the last half of 1891, in 1892 and the first half of 1893, it was a Burning test at 120 degrees Fah., in an open tester, which, because it varies greatly, is equal to a Flash test of from 95 to 110 degrees Fah., probably averages about equal to a Flash test of 100 degrees Fah., in a closed tester, like the one approved by the State Board of Health. The last half of 1893, and in 1894, 1895 and 1896 the legal test was a Flash test at 120° Fah., in the Foster Automatic Tester, which has not been approved by the State Board of Health.

†The total reported damage (\$74,049) for 1889 includes \$40,000 damage caused by a single fire at 678 Jefferson street, Detroit. The fire was caused by a careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

‡Included in these numbers are data relative to 27 reported casualties in 1891, of which the exact dates of occurrence were not reported. In order to make an equitable distribution of these between the first and last halves of the year a proportionate division of them is made, based on the data contained in Table 2 of this article, thus: Table 2 shows that *exclusive* of the above-mentioned 27 casualties, there were reported 121 casualties in the State, in 1891; that 24 (about 20 per cent) of these, occurred in the first half of the year, and 97 (about 80 per cent) occurred in the last half of the year. The 27 casualties, the dates of which are not given, are divided between the first and last halves of the year in the same proportion, that is, 20 per cent of them are added to the first half, and 80 per cent to the last half of the year.

The foregoing tables (2 and 3), based, for 1896, on the data from which Table 1 in this article is constructed and for 1889, 1890, 1891, 1892, 1893, 1894, and 1895 on similar data for those years, are designed to facilitate comparison of the number of casualties and the resultant damages, which occurred in the State from the use of kerosene during those years.

The following lists of casualties show the localities in which the casualties occurred, the nature of each casualty, the damage caused thereby and whatever other details in regard to them this office has been able to collect.

TABLE 3.—*Exhibiting the number of casualties believed to have been consequent on the use of Kerosene in Detroit during each of the years 1889-1896. (Reported by the Fire Marshal of Detroit to the Office of the State Board of Health.) The legal test of Kerosene in each year is explained in the *footnote to Table 2 of this article.*

Year.	Number of Casualties.	Amount of damage done, Dollars.	Number of Lives lost.	Number of Casualties caused by Lamp explosions.	Number of Casualties caused by Stove explosions.
1889.....	35	*65,250	3	14	2
1890.....	44	18,282	0	15	6
First six months of 1891.....	14	2,878	0	9	2
Last six months of 1891.....	41	9,760	2	26	5
Total for year 1891.....	55	12,638	2	35	7
1892.....	79	39,306	2	37	13
First six months of 1893.....	37	20,958	0	19	10
Last six months of 1893.....	34	18,536	0	19	5
Total for year 1893.....	71	39,494	0	38	15
1894.....	55	18,844	3	28	1
1895.....	42	27,471	0	17	0
1896.....	47	17,266	0	26	0

*The total reported damage for 1889 includes \$40,000 damage caused by a single fire at 678 Jefferson street. The fire was caused by careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

List of Casualties consequent on the use of Kerosene in Michigan outside the city of Detroit, calendar year 1896.

Date in 1896.	Locality.	Nature of Casualty.	Amount of Damage, Dollars.	Injury to person.
Jan. 18...	Grand Rapids...	Woman burned to death by careless handling of lamp	\$ 15	Woman fatally burned.
May 12...	Benton Tp.	Overturnd lamp.....		Woman fatally burned.
July.....	Owosso.....	Lamp explosion.....	350	
Dec. 30...	Lansing.....	Lamp explosion.....	None.	Woman severely burned.
Taken from annual reports of health officers. No dates given.	Howell village...	Explosion of lamp.....	Not stated	
	Gilford Tp.	Explosion of lamp.....	Not stated	
	Brownstown Tp.	Explosion of lamp.....	Not stated	
	Cherry Grove Tp.	Building fire with coal oil...	Not stated	One life lost.
	Assyria Tp.	Explosion of lantern.....	Not stated	
	Homer village...	Fire caused by oil stove.....	125	
	Norway City...	Overturnd lamp.....		
	Lowell village...	Lamp explosion.....		

*List of Casualties consequent on the use of Kerosene, in Detroit, Calendar Year, 1896.
(Supplied by William H. Baxter, Fire Marshal in Detroit).*

Date in 1896.	Street and Number.	Nature of Casualty.	Amount of Damage, Dollars.	Injury to Person.
Jan. 11...	173 Jos. Campau.....	Lamp fell.....	\$100	
" 22...	180 Erskine.....	Lamp explosion.....	190	
" 31...	788 Grand River.....	Falling of lamp.....	10	
Feb. 15...	23 Shelby.....	Stove collapsed.....	30	
" 20...	595 Canfield E.....	Falling of lamp.....	2,675	
" 26...	125 Alexandrine W.....	Stove collapsed.....	321	
Mar. 1...	17 High W.....	Lamp explosion.....	1,288	
" 15...	131 Michigan.....	Oil heater collapsed.....	1,085	
" 16...	93 Baker.....	Oil heater collapsed.....	28	
" 20...	305 Fourteenth.....	Oil heater collapsed.....	80	
" 22...	411 Hastings.....	Lamp explosion.....	85	
April 21...	401 Porter.....	Lamp explosion.....	55	
" 23...	125 Napoleon.....	Lamp upset.....	60	
" 25...	491 Clinton.....	Lamp explosion.....	301	
May 5...	470 Illinois.....	Lamp explosion.....	325	
" 10...	265 Jefferson.....	Lamp explosion.....	21	
" 11...	315 Jefferson.....	Careless use.....	529	
" 11...	106 Thirty-fifth.....	Lamp upset.....	25	
" 12...	454 Woodbridge E.....	Careless use.....	159	
June 3...	343 McKinstry.....	Lamp explosion.....	503	
" 12...	825 Gratiot.....	Blazing stove.....	28	
" 30...	232 Riopelle.....	Careless use of stove.....	214	
July 2...	247 Randolph.....	Lamp explosion.....	400	
" 3...	483 Hastings.....	Lamp explosion.....	220	
" 4...	487 Waterloo.....	Lamp explosion.....	379	
" 20...	153 Canfield E.....	Lamp explosion.....	730	
" 22...	43 Waterloo.....	Lamp explosion.....	168	
Aug. ...	353 Fort.....	Careless use of stove.....	30	
" 7...	178 Alfred.....	Lamp exploded.....	5	
" 7...	243 Alfred.....	Lamp exploded.....	25	
" 14...	810 Eighth.....	Lamp exploded.....	166	
Sept. 14...	65 Macomb.....	Lamp explosion.....	556	
" 21...	263 Erskine.....	Lamp explosion.....	225	
" 23...	151 Thirty-fourth.....	Falling of lamp.....	520	
" 29...	179 Waterloo.....	Lamp explosion.....	1,238	
Oct. 6...	Foot of Dequindre..	Lamp explosion.....	100	
" 6...	243 Thirty-second...	Lamp explosion.....	440	
" 10...	863 Chene.....	Lamp explosion.....	169	
" 26...	57 High E.....	Oil heater collapsed....	30	

List of Casualties—Concluded.

Date in 1896.	Street and Number.	Nature of Casualty.	Amount of Damage, Dollars.	Injury to person.
Nov. 1..	302 Alexandrine E...	Lamp explosion.....	280	
" 9..	337 Dix.....	Overflowing lamp.....	10	
" 10..	179 Abbott.....	Top of lamp melted off..	530	
" 20..	163 Eighteenth.....	Lamp explosion.....	75	
" 30..	1581 Campbell.....	Lamp explosion.....	2,400	
Dec. 11..	197 Baldwin.....	Careless use.....	220	
" 15..	128 Grand River.....	Lamp explosion.....	46	
" 28..	33 Monroe.....	Lamp tipped over.....	192	

Table 2 shows that in the *State, including* the city of Detroit, there were reported to have occurred 59 casualties, resulting in pecuniary losses amounting to \$17,756.00, and the loss of life of 3 persons. Thirty-three (about 56 per cent) of these casualties were attributed to lamp explosions.

The remaining 26 casualties were attributed to other causes as follows:—Lamps upset, 4; fallen lamps, 4; stoves upset, 1; stoves collapsed, 7; other careless use of kerosene, 10.

In tables 2 and 3, the years 1891 and 1893 are divided into two parts, one comprising the first six months and the other the last six months of those years. The reason for this division is, that the laws regulating the legal test of kerosene in the State were, by legislative enactment, changed during those years, the new laws becoming operative on July first of each of those years. This arrangement of tables 2 and 3, therefore, gives opportunity not only for comparison of the prevalence of casualties in 1891 and 1893 with the other years; but also of the comparative prevalence of casualties in the first and last halves of 1891 and 1893, under the provisions of the old and new test laws.

In 1889, 1890 and the first six months of 1891, the legal test of kerosene in this State was a *Flash* test at 120 degrees Fah. in a *closed* tester, approved by the State Board of Health; that is, that the sale and use of oils which, in a *closed* tester, similar to a lamp, would emit an explosive vapor at a temperature lower than 120 degrees Fah. was prohibited. The law, which took effect July 1, 1891, made the legal test a *Burning* test at 120 degrees Fah. in an *open* tester, not approved by the State Board of Health. That is, the law of 1891 prohibited only the sale of kerosene which would *burn* in an *open* tester at a lower temperature than 120 degrees Fah. As kerosene will emit an explosive vapor at a much lower temperature than that at which it will continue to burn in the open air where the vapor is carried away as fast as formed, and because of the variation in tests in an *open* tester, dependent on varying atmospheric currents and conditions, it is believed that the new *burning* test, at 120 degrees Fah. would probably average not more than equal to a *Flash* test at 100 degrees Fah. in a *closed* tester, like the "State Board of Health Tester." That is to say, that an oil which would burn at a temperature of 120 degrees Fah. in an *open* tester, would probably, when heated to a temperature of 100 degrees Fah. in a *closed* tester, emit explosive gas which would flash; although the same oil if heated in an *open* tester,

might, under some conditions, not flash at a temperature lower than 110 degrees Fah.

In a series of 64 experiments made by Dr. R. C. Kedzie,* with kerosene obtained from various sources, it was found that oils, the average *burning* temperature of which was 128 degrees Fah., *flashed* at an average temperature of 117 degrees Fah. Based on the same proportion, oils which would *burn* at 120 degrees Fah. would emit explosive gas which would *flash* at a temperature of 109.7 degrees Fah.

Experiments made by Prof. Chandler† to ascertain the temperature of kerosene in lamps after they had been burning a number of hours, showed that in one instance he found the temperature 120 degrees, in another 118 degrees, and in another 104 degrees; an average temperature for the three instances of 114 degrees, which is 4.3 degrees higher than the average *flashing* point of oils, the average *burning* point of which is 120 degrees Fah. These experiments seem to show that oil in burning lamps sometimes attains a higher temperature than the *flashing* point of oils, whose *burning* point is 120 degrees Fah. It would therefore seem that oils which would meet the requirements of the Michigan legal test, established in 1891, may, in burning lamps, attain a higher temperature than that at which they would emit explosive gas, and are, therefore, dangerous; for, no oil can be considered safe for illuminating purposes which will give off an inflammable vapor at the highest temperature reached in lamps. This assumption—based upon experiments—that oils passing this legal test are unsafe, seems to be demonstrated by actual experience collected in tables 2 and 3, which show, both in the city of Detroit and in the whole State, that there was a large increase in the number of casualties from the use of kerosene in 1891 and 1892 over 1890, and that as regards 1891 this was caused by the increase in the number which occurred in the last half of that year.

The Legislature of 1893, realizing that illuminating oils which would pass the legal test established by the Legislature of 1891, were unsafe, and a menace to the lives and property of the citizens of the State, enacted a new law (Act 94, Public Acts of 1893), which appeared to, but did not actually re-establish the legal test in force prior to the change in 1891. Instead of requiring the test to be made in a "State Board of Health Tester," the law requires it to be made with a patent tester, through which a current of air is caused to pass, over a lighted taper, thus distilling off vapor so gradually that the oil does not flash at as low a temperature as the same oil would in a "State Board of Health Tester."

Section 2 of this law, which became operative July 1, 1893, reads as follows:—

"SEC. 2. The State Inspector provided for in this act is hereby empowered to appoint a suitable number of deputies: *Provided*, That the number of said deputies so appointed shall not exceed twenty-two, which deputies are hereby empowered to perform the duties of inspection and shall be liable to the same penalties as the State Inspector: *Provided*, That the State Inspector may remove any of said deputies for reasonable cause. It shall be the duty of the inspector and his deputies to provide themselves at their own expense with the necessary instruments and apparatus for testing the quality of said illuminating oils, and when called upon for that purpose to promptly inspect all oils hereinbefore mentioned, and to reject for illuminating purposes all oils which will emit a combustibile vapor at a temperature of one hundred and twenty degrees of Fahrenheit's thermometer: *Pro-*

*Published in the First Annual Report (1873), of the Secretary of the Michigan State Board of Health, pages 44 and 45.

†First Annual Report (1873), of the Secretary of the Michigan State Board of Health, page 55.

vided, The quantity of oil used in the flash test shall not be less than half pint. The oil tester adopted shall be the Foster automatic tester cup, with a lighted wick placed inside the tube, and under the thimble which shall be used by the inspector and his deputies."

In considering the effect of the legal test of kerosene on the number of casualties resulting therefrom, it is noticeable, as shown in Table 2 of this article, there has been a decrease of casualties since the present law went into operation; still the number of casualties in 1894 is greater than it was in the years before the test was lowered in 1891. This may be due to the fact that the tester cup used in 1889 and 1890 required a higher grade kerosene to pass the test of 120 degrees Fah. than does the Foster cup now in use. The present test of 120° F. by the Foster cup permits the use of kerosene which, tested by the old State Board of Health tester, would flash at several degrees below 120° F.

PERSONAL INJURIES CONSEQUENT ON THE USE OF KEROSENE.

The following extracts from correspondence of this office, and from newspaper items, which came to the notice of the Secretary of this Board, give in detail the circumstances connected with some of the casualties from the use of kerosene, which resulted in a loss of human life and other personal injuries to citizens of this State in 1896:—

A Woman Fatally Burned by Kerosene in Grand Rapids.

The following item appeared in the Detroit Journal of Jan. 16, 1896:—

"Grand Rapids, Mich., Jan. 15.—Special.—Mrs. R. J. Johnson, the woman so severely burned last night by upsetting a lamp in the Grinnell block, died this morning at the hospital as a result of her injuries."

Jan. 18, the usual letter of inquiry was sent from this office, and in reply L. E. Best, Coroner, wrote substantially as follows:—

"There was an explosion, of kerosene. The body was burned so seriously that recognition was difficult, and the clothing was completely destroyed. The lamp was lighted and the casualty was the result of contact with the flame. The deceased was comatose when discovered and remained so until death.

"It was carelessness on the part of the person deceased at the time of lighting. From the appearance of the lamp it was old and unsafe.

"There was a slight damage, less than \$15.00."

A Woman Fatally Burned by Kerosene in Benton Township.

The Detroit Journal of May 12, 1896, contained the following item:—

"Benton Harbor, Mich., May 12.—Special.—Mrs. Henry Leitz, a German woman whose clothing caught fire from a kerosene lamp explosion Saturday evening, died of her injuries. Before she died she became deranged and attempted suicide."

In reply to inquiries by this office, H. V. Tutton, M. D., health officer of Benton Harbor city, wrote:—

"Replying to your inquiry concerning burning and death of Mrs. Leitz, I enclose clipping from the 'Daily Palladium' of May 11, giving substantially the facts.

"The case occurred in Benton Township."

The following is copy of the clipping referred to by Dr. Tutton:—

"Mrs. August Leitz, a German lady residing in the McAllister addition, died in terrible agony at 5 o'clock Sunday afternoon from the effects of burns received while trying to extinguish a fire caused from the overturning of a kerosene lamp at her home about 9 o'clock Saturday evening.

"Mrs. Leitz's mother, an aged lady, resides with the family and she had gone up stairs with a lamp which she placed on the floor near an open window. By some means the lamp

was overturned, which ignited the oil and set fire to the carpet. Answering the old lady's call for help Mrs. Leitz ran up stairs and in her fright threw herself bodily upon the burning oil and succeeded in putting out the blaze on the carpet but in the act her clothes took fire and she was quickly enveloped in flames. Her husband was away from home and there being no one present who could render any assistance the woman in her frenzy ran out of doors to the pump and threw herself into a tub of water, but before she reached the pump her clothing had nearly all burned off and her body was a mass of charred flesh from head to feet.

"Hearing the unfortunate woman's screams a number of neighbors hurried to the house, but were too late to give her any assistance other than to carry her into the house and send for a physician.

"Dr. Geo. Bell was called but he found her so severely burned that there was no chance for recovery and all that could be done was to make external applications and administer medicines to relieve in a measure the terrible pain until death should release her from her suffering. He found that she was severely injured internally from inhaling fire and smoke and that her nerves were completely shattered by the shock."

A Person Fatally Burned by Kerosene in Cherry Grove Tp.

James Bell, health officer of Cherry Grove township, Wexford county, in his annual report to this office, reported the death of one person (sex not stated) caused by lighting a fire with kerosene. No further details of this casualty were given.

A Woman seriously Burned by Kerosene in Lansing city.

Notice of a casualty which resulted in the burning of Mrs. Dunnebacke in Lansing, appeared in the State Republican of Dec. 30, 1896.

In reply to enquiries from this Office, the health officer confirmed the report and stated that Mrs. Dunnebacke was seriously burned on both hands and right arm, and that the casualty was due to the explosion of kerosene in a lamp.

INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO HAVE BEEN CAUSED BY THE USE OF GASOLINE IN MICHIGAN IN 1896.

In 1896, as in former years, an effort was made, at the office of the Secretary of the State Board of Health, to collect facts respecting every casualty attributed to the use of gasoline, in Michigan, which came to notice. During the year there were received at the office of the Secretary of the Board reports of 39 casualties in 7 different parts of the State, alleged to have been caused by gasoline, with attendant losses of life and property, and personal injury as follows:—Two persons fatally and one person severely injured; damage to property to the amount of \$6,907.00.

The amount of pecuniary loss was not reported in 5 of the above-mentioned 39 casualties.

TABLE 1.—*Casualties in Michigan during the year 1896, believed to have been consequent on the use of Gasoline, information of which was received at the office of the Secretary of the State Board of Health.*

	Number of Casualties.	Number of Localities.	Pecuniary Losses. Dollars.	Lives Lost	Persons injured (not fatally).
In Detroit.....	33	1	6,457	0	0
In State (outside Detroit)	6	6	450	2	1
Totals in Michigan.....	39	7	6,907	2	1

Of the 39 reported casualties from the use of gasoline during the year 1896, 7 were attributed to stove explosions, 24 to leaking or overflowing stoves, and 8 to carelessness in handling gasoline, and various other causes.

THE SOURCE OF DANGER IN THE USE OF GASOLINE.

The special source of danger in the use of gasoline, is its ready vaporization at low temperatures. When exposed to the air, gasoline evaporates quickly, its vapor mixes with the air, and therewith forms an explosive mixture which readily ignites when it comes in contact with a flame or other sufficient cause. This property of gasoline renders it more dangerous than is gunpowder. Some of the casualties reported, were undoubtedly the result of ignorance, or disregard, of these facts.

Below are given details relative to reported casualties. The correctness of the details has been confirmed by health officers or other officials of the localities where the casualties occurred.

A Woman Fatally Burned by Gasoline in Battel Creek.

The Detroit Journal of Oct. 7, 1896, contained the following news item:—

"Battle Creek, Mich., Oct. 6.—Special.—By the explosion of a gasoline stove this noon, Mrs. Levi Goodrich was fatally burned. She was alone in the house with ten small children at the time."

In reply to a letter of inquiry sent from this office, S. S. French, M. D., health officer of Battle Creek, wrote as follows relative to this casualty:—

"Yours of yesterday concerning the death of Mrs. Levi Goodrich came today. In reply I say that there was no explosion. The incidents were as follows: The gasoline in the tank took fire. She grasped it by the handle to throw it out. The solder by which the handle was fastened to the tank melted, when it fell (still burning) to the floor, setting fire to her clothes. She was alone, except *two* instead of *ten* children (grand children) the oldest 6 years old. She ran outdoors and before help could arrive she was fatally burned. There was no damage except her clothing and the bedding used in putting out the fire on her, except perhaps the room being badly smoked up. The little 6 year old girl ran to the nearest alarm box and called the fire department. The deceased lived eight hours. How the gasoline came to take fire I have been unable to find out. She said but very little, only 'I did it to save the children.' Soon became unconscious."

Death in Highland Park village caused by Gasoline.

The health officer of Highland Park village, Wayne county, in his annual report to this Office, stated that one person was fatally burned in a fire caused by gasoline; but did not state the sex of the person nor other details relative to the casualty.

A Woman badly Burned by Gasoline in Raisonville Township.

The "Monroe Democrat" of July 30, 1896, contained the following news item:—

"A week ago last Wednesday, while Mrs. William Knapp was cooking dinner on a gasoline stove, the gasoline can burst and Mrs. Knapp was immediately in a flame of fire, and undoubtedly owes her life to Mr. Knapp, sr., who hurried to her assistance. If it had not been for the speedy arrival of the neighbors, the house would have burned. Mrs. Knapp although not seriously, is badly burned."

In reply to inquiry from this office, the health officer of the township wrote:—

"Yours of the 4th at hand. And I would say, as near as I can find out, there was an explosion at the residence of Mr. W. Knapp, caused by gasoline. There was a fire. Mrs. Knapp was burned on the face and body. There was damage to the house about \$450."

ALLEGED NUISANCES IN MICHIGAN IN 1896.

During the year 1896, communications relative to 67 alleged nuisances, were received at the office of the State Board of Health, from fifty-eight localities in Michigan.

The causes to which the alleged nuisances mentioned in these communications were attributed, may be classified as follows:

Hogs fed on dead animals, 2; contaminated ice, 1; slops, night-soil, garbage, etc., dumped on ground, 5; sewer pipes and drains, 4; privy-vaults, cess-pools, etc., 2; dead animals, 11; slaughtering, rendering and slaughter-houses, 7; hog-pens, cattle yards, stables, etc., 5; overcrowded school room, 1; shallow graves, 1; unsanitary condition of premises, 2; overflowed lands, 3; corpse of a man insufficiently buried, 1; fertilizer factory, 1; log jam in Chippewa river, 1; waste from butter factory, 1; saw-dust and other refuse thrown into lakes and rivers, 2; diseased meat, 1; cemeteries, 1; foul meat-market, 1; mill ponds, 2; veterinary practice, 1; pomace from cider mills, 2; filthy state of villages, 2; stagnant water, 5; manure piles, 1; unsanitary condition of Delray and vicinity, 1.

Whenever complaint of an alleged nuisance is received at this office, the president of the local board of health whose duty it is to act, is usually informed of the nature of the nuisance, and the local board is requested to investigate the same. At the same time, sections of law, and pamphlet publications of this Board, pertaining to nuisances and to the duties of local boards of health relative thereto, are sent to him, and also to the person making complaint. Two regular forms of letters are used for this purpose, copies of which are here given. The first is sent to the person making complaint of the nuisance, the other is sent to the president of the board of health of the locality where the nuisance is reported to exist.

STATE BOARD OF HEALTH, MICHIGAN.

OFFICE OF THE SECRETARY.

Lansing.

Section 1649, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness which may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

Section 7965, Howell's Statutes, give the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate and complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, applications should be made to the circuit judge.

If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance and for the abatement of the same.

Herewith I send you our pamphlet, "Work of Health Officers and Local Boards of Health in Michigan," on pages 10 and 11 of which are paragraphs bearing on the subject of nuisances, and I send you also some other pamphlet publications of this office bearing on the same subject.

I have not asked the attention of the president of the Local Board of Health to this subject. If this office can be of any further service to you in this case, it will give me pleasure.

Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate the alleged nuisance, and with what result.

Very respectfully,

Secretary.

STATE BOARD OF HEALTH, MICHIGAN.
OFFICE OF THE SECRETARY.
Lansing.

President of the Board of Health.

Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate, and complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

Herewith I send you our pamphlet, "Work of Health Officers and Local Boards of Health in Michigan," on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pamphlet publications of this office bearing on the same subject.

I shall be glad to be informed whether or not, on examination, this alleged nuisance proves to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed.

Very respectfully.

Secretary.

As compared with the preceding year, there was an increase of six in the number of nuisances reported to this office in 1896.

In articles on alleged nuisances, published in previous Annual Reports of this Board, attention was called to the fact that a large proportion of the communications received at this office in regard to alleged nuisances came from local health officers and other township, city and village officials, asking for information relative to points of law concerning nuisances, or requesting advice as to their duties, or to the proper legal procedure necessary to effect the prevention or abatement of nuisances. The correspondence of 1896, shows a desire on the part of the local health officials for advice and coöperation of this Board, which has been freely and cheerfully given, and it is believed, with beneficial results to the public health.

The State Board of Health has no authority to enforce or order the abatement of a nuisance. Its powers in this respect are advisory. And while the office of the Secretary of the Board is willing to render such advice as it may be able to give on any subject, it is often the case in regard to nuisances that prosecuting attorneys, or other lawyers, in the immediate vicinity, and acquainted with the facts, are in better position to give legal advice than is the Secretary of the State Board of Health. The State Board is always glad to learn of the efforts of local boards to abate nuisances, and what success attends those efforts; and solicits correspondence upon this subject. It cannot, however, undertake to do for local boards that which the law has so well provided for their doing for themselves. In showing them how they can help themselves it really does more for them than to do their work; for when the local board has mastered the situation and removed a nuisance, it has secured a vantage ground which a distant authority could not so well secure and hold.

The following extracts from the correspondence of this office relative to the above-mentioned alleged nuisances in 1896, show the nature of some of those nuisances, and the action taken and recommended to be taken in regard to them by the Secretary of this Board.

HOGS FED ON OTHER DEAD ANIMALS.

Dead horses fed to hogs in Ishpeming city.

Jan. 11, 1896, Geo. G. Barnett, M. D., health officer of Ishpeming city, wrote to the Secretary of this Board as follows:—

"What shall I do with a man who when one of his horses died, drew it into the barn-yard and allowed his hogs to eat it? When it froze too hard for their teeth he would build a fire around the carcass to thaw it out—this all right in the middle of the city within a stone's throw of several houses. * * * * Instruct me as to how to proceed."

In reply to Dr. Barnett's enquiry, Jan. 20, 1896, the Secretary wrote:—

"Sec. 9323 Howell's Statutes, provides a penalty for any person or persons who shall dispose of the carcass of a dead animal by leaving it exposed on the ground. The same and every part thereof should be buried at least two feet underground."

By letter dated March 2, 1896, Dr. Barnett informed the Secretary that this nuisance had been abated.

Hogs fed on dead animals in Bay City.

Dec. 9, 1896, Wm. Kerr, M. D., health officer of Bay City, wrote as follows to the Secretary of this Board:—

"I am instructed by the local Board of Health to ask your opinion in regard to the sale of pork from hogs fed by scavengers, and your advice as to how to prevent the sale of the same in our community. It seems that one Kostka who collects the dead animals about the city and has a 10 or 15 year contract for the work runs a private enterprise of hog feeding, and it is said disposes of the pork here in Bay City."

"What we would like to know is, can he be prevented from such practices by any State law, and if not what advice could you give us?"

Dec. 12, 1896, the Secretary replied to Dr. Kerr's letter as follows:—

"Your letter of Dec. 9, relative to hogs fed on dead horses, etc., is before me. I am not aware of any specific law on this subject, although there may be one. Your city attorney may be able to refer you to it. However, your local board of health could frame and publish rules which would regulate such a business in the city. When framed and published in accordance with sections 1636 and 1639 Howell's Statutes, the rules would have force of law. My idea is that this practice should not be permitted."

SEWAGE—CONTAMINATED ICE.

Jan. 12, 1896, it was reported to this office that two hotels in the village of Rochester, Oakland county, filled their ice-houses with ice cut from Clinton river at a point where a large amount of sewage, among which was the sewage from the asylum at Pontiac, empties into said river.

On receipt of the letter, the Secretary wrote to the president of Rochester village, informing him of the complaint made and, continuing, said in substance: I should consider this a very dangerous condition of affairs which should receive the immediate attention of the local board of health; and if the allegations are true, the nuisance should be abated. Typhoid fever might easily be spread by ice infected with the germ of the disease from this cause, as it is known that once freezing does not cause the death of the typhoid bacillus; and ice infected with this bacillus would, if used in water, milk, tea, butter, etc., be extremely dangerous.

SLOPS, NIGHT-SOIL, GARBAGE, ETC.

Night-soil dumped near a residence, an alleged nuisance.

Jan. 14, 1896, a resident of Howell village complained to this office that contents of privy-vaults and cess-pools were dumped on the ground near his residence, and a nuisance thereby created. Said dumping ground was situated just outside the village limits.

The Secretary, following the usual course in such cases, by letter dated Jan. 15, 1896, informed the supervisor of Osceola township of the complaint made, and requested that the local board of health investigate, and if a nuisance was found to exist that it be abated.

Garbage of Durand village dumped in Vernon township.

March 18, 1896, a resident of the village of Durand complained to this office that persons having the contract for the removal of garbage from the village of Durand, dumped said garbage, which consisted largely of privy contents, on a farm in Vernon township, near the highway, and that a horrible stench, which was injurious to the public health, arose from it.

The Secretary by letter dated March 21, 1896, informed the supervisor of Vernon township of the complaint made, and urged the importance of the attention of the local board of health being given to this alleged nuisance.

Waste water in Carson City village, an alleged nuisance.

June 15, 1896, a resident of Carson City village, Montcalm county, wrote as follows to this office:—

"What can be done with an incorporated village which will allow the water from a hotel to empty right in front of a man's house, and remain there until it causes a stench, which becomes injurious to public health?"

In replying to the above enquiry, the Secretary pointed out to the complainant the proper legal procedure in the abatement of nuisances; and later wrote to him as follows:—

"The law in this State does not make it the duty of the State Board of Health to abate nuisances; that is required of the local board of health. If the local board of health does not enforce the law, you could report the failure to the prosecuting attorney."

Slops thrown on ground, an alleged nuisance.

July 13, 1896, R. S. Hause, health officer of Iron River village, Iron county, complained to the Secretary of this Board that a family residing in the business part of the village created a nuisance by throwing slops in their backyard which, consequently, emitted foul odors. The family had several times been notified to cleanse the premises, but neglected to do so, and the health officer wanted to know what steps should be taken to compel compliance with the notification.

July 15, 1896, the Secretary sent Mr. Hause the desired information.

SEWERS AND DRAINS, ALLEGED NUISANCES.

Defective sewer in Harbor Springs village.

Jan. 18, 1896, a resident of Harbor Springs village, Emmet county, wrote to the Secretary of this Board as follows:—

"Last summer this village built a sewer from the bay to and on the bluff, putting the tile together without using cement at the joints—and the connections at street corners to take the surface water have no traps. They use No. 14 sheet steel, riveted to reach out in the bay from the shore. They are about levying an assessment for another sewer to be constructed in like manner, running east and west through Main St. An effort has been made to have the joints cemented, and traps at street openings, but with no success. I think a few lines from you on the subject would be listened to as to how the work should be done."

Complying with the suggestion contained in the last preceding letter, Jan. 21, 1896, the Secretary wrote to the president of the village:—

"I am informed that last summer your village built a sewer, putting the tile together without cement at the joints, and the connections at street corners for surface water have no traps. It is reported to this office that your village now proposes to construct another sewer in like manner. I write this letter for the purpose of respectfully suggesting that that is hardly a proper way to do in any village. And any village which persists in such unsanitary methods ought not to aspire to be a health resort, nor a summer resort. I sincerely hope that your village will not persist in such unsanitary work."

Closed outlet to drain in Ovid village.

April 25, 1896, J. Benson Hill, M. D., health officer of Ovid village, Clinton county, wrote as follows to this Board, for information:—

"Will you kindly give me instructions how to act in the following case? Mr. V. has dammed or closed a natural outlet for a drain, and by so doing has formed a pool of water which will become stagnant. I have ordered the drain opened. Our village attorney, H. M. High, told the village marshal it was not in the hands of the village, but in the drain commissioner's. Please send instructions."

Replying to Dr. Hill's letter, April 28, 1896, the Secretary wrote:—

"This is a subject for the attention of the local board of health of the village. I am not an attorney and do not know what the duties of the drain commissioners are, but this subject, if the board finds it a nuisance, can be dealt with by the board of health."

Drain in Vermontville village, an alleged nuisance.

Dec. 16, 1896, a resident of Vermontville village, Eaton county, complained to the Secretary of this Board that owing to the closing of the natural outlet of a drain, water backed into his cellar, which was kept wet the whole year, and which it was believed caused sickness in his family.

Dec. 17, 1896, the president of the village was informed from this office of the complaint made and his attention to the subject was requested.

Dec. 28, the president of the village informed the Secretary that the subject had been under consideration and the nuisance would be abated.

PRIVY-VAULTS, ETC., ALLEGED NUISANCES.

Privy-vault in Everett township, an alleged nuisance.

Jan. 20, 1896, Eli Cool, health officer of Everett township, Newaygo county, wrote to the Secretary of this Board, as follows, for advice:—

"A few weeks since the Treasurer of the Aleyton School Board requested me to examine privies at said Aleyton schoolhouse, and have something done to remove filth from same. I visited the place and found the vault full, and scholars were using the floor, which made it a very filthy place indeed. I ordered school directors to have a new vault dug, privy removed, and old vault covered. The school director has given no attention to the order and says it is unnecessary to go to this trouble. I saw the school Treasurer the other day, and he still insists upon my having the matter attended to, or prosecute the director. I made a complaint to our supervisor, but as our township is opposed to expenses of almost every kind he did not care to have anything to do with it. Therefore I would kindly ask that you would advise me in the matter. Does such work really belong to the local Board of Health to look after, or shall I let School Board settle it to suit themselves?"

Jan. 22, 1896, the Secretary replied to Health Officer Cool's letter as follows:—

"Replying to your letter of Jan. 20, a schoolhouse privy in the condition you describe should certainly be investigated by the *local board of health*, and declared a nuisance, if found to be one, and abated according to the law. I hope the local board of health will give the subject their immediate attention.

"I have written the supervisor on this subject."

On the same date the Secretary wrote to the supervisor of Everett township, advising him of the complaint made, and asking his attention to this subject.

Feb. 24, 1896, Health Officer Cool reported to the Secretary that the nuisance had been abated by the substitution of a new vault for the old one.

DEAD ANIMALS, NUISANCES.

Insufficiently buried carcasses of horses, an alleged nuisance.

Jan. 26, 1896, J. W. Clements, health officer of Chester township, Eaton county, wrote to the Secretary of this Board for advice, as follows:—

"There is a poor man in our town who has been killing old horses for their hides. He left the carcasses on another man's land, and when asked to bury them he threw a little dirt over them. Most of them have become bare again, and are smelling quite a little. I will ask you whose place it is to take care of them, and what action I must take in regard to them."

Jan. 28, 1896, replying to Health Officer Clements' letter, the Secretary wrote:—

"Section 9323 Howell's Statutes provides a fine and imprisonment for any person or persons who shall put any dead animal or part of the carcass of any dead animal in any field, meadow or common, or in any place within one mile of the residence of any person, unless the same and every part thereof is buried at least two feet underground."

On the same date the Secretary wrote to the president of the board of health of Chester township advising him of the complaint, sending him copy of Section 9323, Howell's Statutes, and asking his immediate attention to the subject.

In reply to the Secretary's letter, C. W. Dean, supervisor of the township, wrote stating that the nuisance existed as reported, and that the subject was being investigated by the local board of health. Continuing, Mr. Dean wrote:—

"They, the horses, are on the flats near the Thornapple river, on property of parties who do not reside in the township, are about one-half mile from any residence and from 25 to 30 rods from highway. They lie above ground. The high water about Christmas took off the covering if they ever had any. Since the stir has been made Mr. C— has made some show at covering with a little dirt and brushwood; perhaps from two to four inches of dirt are frozen over them, the rest is snow, ice, etc. The trouble is they are in ice and water, the water surrounding them is from four inches to more than one foot in

depth. The soil is extremely porous and any excavation would immediately fill with water. They are decayed too much to be removed to higher ground. Just now, while it is cold, it disturbs no one, but the future is the question. Dogs are running to them.

"The board of health are at a loss to know what to do.

"1. Can it be declared a nuisance *now*? Mr. C— is a poor man.

"2. Can he be made to take care of it? The *owners* of the land knew nothing about the matter until done.

"3. Can they be made to take care of it?

"4. Should the Board declare it a nuisance? Before taking any further action?

"5. Should they hire some one to see to it, and charge the same to the township? Or is this a case where there is not a *plain, adequate and complete* remedy at law, and should be laid before the Circuit Judge? We would like an answer by Tuesday, as we are to meet Wednesday."

In response to Mr. Dean's letter the Secretary wrote, Feb. 6, 1896:—

"Please accept cordial thanks for your letter of Feb. 1, relative to the dead horses being a nuisance. Your questions would have been answered before had I not been confined to the house by sickness.

"Considering the situation you describe, I think it probable that the best way would be to let them remain as they are for the present. As long as they are frozen up in ice and there probably is no stench, will probably not annoy any one until warmer weather; but, as soon as they commence to thaw, or sooner if practicable, the carcasses and every part thereof should be covered at least two feet with earth, in accordance with Section 3323 Howell's Statutes. As this section provides a heavy fine and imprisonment for violation, I should think the person putting the bodies there should be required to care for them. If that is not practicable, the board of health should see that it is done, and I should think the expense for such work would be on the township. However, this is a question of law and if there is any doubt, perhaps some attorney or the prosecuting attorney should be consulted."

A dead horse in Allen township, an alleged nuisance.

March 11, 1896, F. G. Legge, M. D., health officer of Allen township, Hillsdale county, wrote as follows to this office relative to this nuisance:—

"I have a case upon which I wish your advice. Two men live upon farms joining. Near the line fence one man has a spring of water. He is obliged to use the water from this spring a part of the time. The other man has buried a horse on his own land, and about four rods from the spring. The spring owner complains to me that the dead horse is so near his spring that he is afraid to use the water. Would like your advice in this case, and the law covering same.

"Please reply as soon as possible and oblige."

March 12, 1896, the Secretary replied to Dr. Legge's letter, stating that he believed a dead animal buried so near a source of water supply was a nuisance which should be abated.

March 17, 1896, Dr. Legge informed the Secretary that the nuisance had been abated.

A dead horse an alleged nuisance, in Middlebury township.

March 18, 1896, Geo. Stanlake, health officer of Middlebury township, Shiawassee county, wrote to the Secretary of this Board, stating that a resident of his jurisdiction had complained that a dead horse had been buried on the lot adjoining his. Continuing, Mr. Stanlake wrote:—

"In your opinion is there any danger that the decomposition might affect the wells in that neighborhood? It is sandy soil. If so, give me a few pointers so I may use them to convince the man that he must remove the body."

March 19, 1896, the Secretary replied to Mr. Stanlake's letter as follows:—

"If such a dead horse were buried within one hundred and fifty feet of any well I would think there was danger of contaminating the water of that well. It ought to be many rods away from any well. I believe this is a subject which should receive the immediate attention of the local board of health."

Dead geese, an alleged nuisance.

March 21, 1896, F. J. Brown, M. D., health officer of Butler township, Branch county, reported to this office that a resident of his jurisdiction had complained that a neighbor hung dead geese in a tree opposite his door, that said geese emitted an offensive odor, and that the neighbor refused to remove them.

The Secretary informed the president of the local board of health of the alleged nuisance, and it was abated.

Dead cow, an alleged nuisance.

March 31, 1896, Ensley Brown, health officer of Lynn township, St. Clair county, wrote to this office for advice, as follows:—

"There is a neglectful man here had a cow die sometime ago. I notified him on the 29th of February, to bury it and he promised to, but did not. Today I hired a man and we buried it, as he had plenty of time before and did not attend to it. Now he is not collectable for anything. What can I do with him, and how will I proceed, as I expect to have some trouble with him, as I presume, if he has another die he will neglect it the same way? Any information you can give me will be thankfully received."

April 1, in reply to Mr. Brown's letter the Secretary wrote:—

"Replying to your letter of March 31, Section 9323 Howell's Statutes, provides that any person or persons putting any dead animal, or part of the carcass of any dead animal in any road, street, alley, field, meadow, or common, shall be liable to a fine, and default in the payment thereof, shall be imprisoned. It is your duty as health officer to report this violation to the supervisor, whose duty it is to commence prosecution. The prosecuting attorney of your county will aid the supervisors if requested. I hope you will report this violation to the supervisor, giving him complete facts, regarding names, dates, etc."

Dead Horse in Mottville Township, an alleged Nuisance.

April 22, 1896, J. W. B. Fort, M. D., health officer of Mottville township, St. Joseph county, wrote to the Secretary of this Board stating that a dead horse had been hauled to the river bank by its owner and there left exposed. The owner had been notified to bury it, but had neglected to do so. Dr. Fort stated that he had caused the carcass to be buried, and wished for instructions as to the proper legal procedure in such cases.

In reply to Health Officer Fort's inquiries, the Secretary sent him a copy of section 9323, Howell's Statutes, which treats directly of the burial of dead animals, and also informed him that, as a health officer, it was his duty "Under the law to report this violation to the supervisor, whose duty it is to prosecute. If requested the prosecuting attorney will conduct the suit."

Unburied Carcasses of Animals in Douglas Township.

April 1, 1896, C. A. Carle, M. D., health officer of Douglas township, Montcalm county, wrote as follows to the Secretary:—

"What is the law in regard to dead animals being left on the premises unburied? We are getting tired of this thing being done here, and this is putting the town to the expense of burying them. Please inform me what can be done. Is it a criminal procedure? Hoping for a prompt reply."

April 21, 1896, information similar to that sent to Dr. Fort (relative to the last preceding nuisance) was sent to Dr. Carle.

Dead Fish in Mottville, an Alleged Nuisance.

May 11, 1896, F. W. Sassaman, M. D., health officer of Mottville township, St. Joseph county, wrote to this office stating that a nuisance, in the shape of dead fish on the banks of the St. Joseph river, existed in his jurisdiction, and asked for instructions how to abate it.

In reply to Health Officer Sassaman's letter, the Secretary suggested, as the best way to abate the nuisance, that the local board of health have the dead fish collected and buried.

Cow and Calf left Unburied in Wakefield Village.

May 15, 1896, J. La Salle, health officer of Wakefield village, Gogebic county, wrote to this office substantially as follows:—

"I was notified that a cow and calf were lying dead on the premises of a resident of the village. I went immediately and saw said resident. He is a very old man and very poor, and the father of a large family. He had at the time one little girl dead and one boy dying, and his wife sick in bed for over six weeks. The people in Wakefield made a collection to help him to bury the children. Seeing the condition on the premises I hired a team and had the cow and calf removed and buried, and the premises cleaned up. The bill of expenses attending this work was \$7.50, which the owner of the animals is unable to pay, and which the village authorities refuse to pay, claiming that I had no authority to do such work. Please advise me what to do?"

May 18, 1896, the Secretary replied to Mr. La Salle's letter as follows:—

"Your letter of May 15, relative to the removal and burial of a cow and calf on the premises of Peter Carr, is before me, for which please accept thanks.

"Circular 120, 'Relative to the work of Health Officers,' etc., is especially prepared for health officers, defining some of their duties; and I think if you had carefully read the circular you would have found that no one member of the board of health could have done what you did relative to the removal and burial of the dead cow and calf. Section 1640 Howell's Statutes requires *boards of health* to examine into all nuisances, sources of filth and causes of sickness that may, in their opinion, be injurious to the health of inhabitants, and destroy, remove or prevent the same as the case may require.

"While you may have exceeded your authority as health officer, yet it is true that the dead cow and calf should have been removed or buried, as it certainly would have become a nuisance or source of filth, if left unburied, and I think the board of health should properly compensate you for the work performed, if Mr. Carr is not able to do so."

Information requested relative to burial of dead animals.

June 22, 1896, P. H. S. Lynch, M. D., health officer of Spaulding township, Menominee county, wrote to the Secretary of this Board as follows:—

"Where can I find the law regulating nuisances? Must a man bury a horse, dog or other animal? Can I make a man do so and make him clean up his premises?"

June 24, 1896, copies of 1640 and 7965 Howell's Statutes, and pamphlet publications of this Board containing the information asked for, were sent to Dr. Lynch from this office.

Removal of the buried carcass of a horse requested.

Nov. 16, 1896, L. D. Courtright, a resident of Benton Harbor city, complained to the Secretary of this Board that a neighbor had killed and buried a horse 25 to 28 inches below the surface, within 125 feet of his house. At the same time a petition signed by Mr. Courtright and four others requesting the removal of said horse, was received at this office.

Nov. 19, 1896, the Secretary wrote to John Bell, M. D., president of the local board of health, informing him of the complaint made, calling his attention to section 9323 Howell's Statutes, which bears on the burial of dead animals, and continuing the Secretary wrote:—

"It would seem the burial of this horse was in accordance with the State law; but if you have no local rule which will prevent such burial in your city, it seems to me that your local board of health should have such a rule as soon as practicable.

"If this horse is a nuisance, it should be removed. The subject is respectfully referred to you for such action as your judgement shall dictate."

Nov. 23, 1896. Dr. Bell replying to the Secretary's letter stated that the horse in question was buried with Mr. Courtright's consent, that the carcass was 25 to 30 inches below the surface, and that after investigation he (Dr. Bell) and the health officer were of opinion that there was no nuisance and that no injury could come to any person from that cause.

A local paper referring to the local board of health says:—

"The board adopted a new rule to the effect that it shall hereafter be unlawful to bury the bodies of any domestic animals within the city limits of Benton Harbor without a special permit from the health officer. The rule was made necessary from the fact that several persons have buried dead horses on the back of their lots, and the health board has been compelled to order the carcasses dug up."

This action of the local board was apparently taken on the suggestion made by the Secretary of this Board in his letter of Nov. 19, to Dr. Bell.

SLAUGHTERING, RENDERING AND SLAUGHTER-HOUSES.

Information requested relative to location of slaughter-house.

Feb. 1, 1896, H. W. Heasley, M. D., health officer of Salem township, Allegan county, wrote to the Secretary of this Board as follows:—

"Our butcher here owns a lot 8x20 deep, 80 rods from the village, on a by-road, on which two families live. Would it come within meaning of the law to set his slaughter house on the back end of the lot or would it have to be 20 rods to the front of his building?"

Feb. 6, 1896, reply to Health Officer Heasley's letter was sent from this office, as follows:—

"Replying to your letter of Feb. 1, it is not quite plain to me, the situation in the case you mention. Section 1682 Howell's Statutes, provides that no person shall keep or maintain any slaughter house 'within twenty rods of any public highway within this State,' or in any other place except as provided for in Section 1678 Howell's Statutes, which requires the township board of every township, from time to time, to assign certain places for exercising of any trade or employment offensive to the inhabitants, or dangerous to the public health, and shall forbid the exercise thereof in places not so assigned.

"Herewith (by this mail) I send you a number of publications relative to nuisances which I hope may be of use and interest to you."

Slaughter-house in Delhi Township, an Alleged Nuisance.

A resident of the unincorporated village of Holt, Delhi township, Ingham county, complained to this office that a slaughter-house situated 12 rods from his house and 30 feet from the highway was a nuisance.

Feb. 7, 1896, the president of the board of health of said township was advised from this office of the complaint made.

Feb. 8, 1896. E. P. North, M. D., health officer of the township, informed the Secretary that the nuisance had been abated.

Slaughter-house in Vienna Township, an Alleged Nuisance.

March 3, 1896, a resident of Vienna township, Montmorency county, complained to the Secretary of this Board that a slaughter-house in said township was a nuisance by reason of foul odors emitted therefrom.

March 5, 1896, the Secretary by letter informed the president of the local board of health of the complaint made.

March 20, the president replied to the Secretary's letter as follows:—

"I have made investigation and find that there has been no slaughtering done in Vienna since last October, and do not intend to have any more. Found everything clean and good."

Rendering-house, an Alleged Nuisance.

June 19, 1896, a resident of Battle Creek complained to the Secretary of this Board that a rendering establishment just outside the city limits was a nuisance by reason of the foul odors therefrom which pervaded the neighborhood. The alleged nuisance was in Emmet township.

The Secretary informed the president of the local board of health of the complaint made; and July 9, 1896, that official wrote to the Secretary that the nuisance had been abated.

Slaughter-house in Standish Village, an Alleged Nuisance.

A resident of Standish village writing to the Secretary of this Board, July 3, 1896, relative to this nuisance says:—

"We have in our village a butcher who uses his barn for a slaughter-house, killing twice or three times per week, and throwing the offal to his pigs. The stench is simply unbearable. The barn is on the alley about the center of a thickly populated block, and the residents of the block have complained to the health officer and board of health, but they simply ignore the complaints, the owner of the barn or slaughter-house claiming if they want the nuisance abated the council will have to buy his property."

July 6, 1896, the Secretary wrote to the president of the village board of health advising him of the complaint made, and continuing:—

"Section 1678 Howell's Statutes, makes it the duty of the local board of health from time to time to assign certain places for the exercise of trades or employments offensive to the inhabitants or dangerous to the public health and to forbid the exercise thereof in places not so assigned. Section 1682 Howell's Statutes makes it unlawful for any person or persons to maintain a slaughter-house, slaughter-yard, slaughter-pen, or any other place for slaughtering, (butchering) or killing any animals or rendering dead animals as a business, within twenty rods of any public highway."

Slaughter-house in Howard City Village, an Alleged Nuisance.

In July, 1896, two petitions bearing the signatures of 35 residents of Howard City were received at this office. Said petitions set forth that several slaughter-houses, which by reason of foul odors and filthy conditions were a nuisance, and were a menace to public health, were maintained within the corporate limits of the village; and requested the abatement of the nuisance.

July 10, the usual letter of advice was sent to the president of the local board of health, to which no reply was received.

Sept. 23, 1896, the president of the village wrote to the Secretary of this Board, stating that complaint had been made to the village council

that the slaughter-houses above referred to were a nuisance, that investigation had been made and the owners notified to cleanse and renovate their premises in such a manner as it was believed would overcome the existing unfavorable conditions. The owners having failed to comply with the notification, a committee of the council was appointed "to ascertain the proper steps to be taken to ascertain through the courts whether the slaughter-houses really are a nuisance or not." Continuing, the president wrote:—"Can you give me the required information? Who makes the complaint? Who is it made to? Would the expense of same have to be borne by the village, etc.? I am desirous that we may be enabled to take decisive action in this matter; but under instructions formerly sent us I do not understand that we have any authority to declare them a nuisance."

Sept. 24, in reply to the president's letter the Secretary wrote:—

"Relative to the slaughter-houses which are nuisances, it is the duty of the local board of health to decide whether or not they are nuisances and to see that they are abated or removed, etc.

"Section 1682 Howell's Statutes, provides that no person or persons shall keep or maintain a slaughter-house within twenty rods of any public highway. Section 1678 Howell's Statutes makes it the duty of the local board of health, from time to time, to assign certain places for the exercising of any trade or employment offensive to the inhabitants or dangerous to the public health, and requires the local board of health to forbid the exercise thereof in places not so assigned.

"The other questions in your letter are answered in the pamphlet which I send you herewith marked."

HOG-PENS, CATTLE-YARDS, STABLES, ETC., ALLEGED NUISANCES.

Hog-pen in Petersburg Village, an Alleged Nuisance.

Feb. 11, 1896, F. B. Jones, M. D., health officer of Petersburg village, reported to this office that a man in said village maintained a hog-pen, containing 12 hogs, within 25 feet of his neighbor's kitchen, and asked what he should do about it.

Feb. 13, 1896, the Secretary replied to Dr. Jones' letter as follows:—

"Replying to your letter of Feb. 11, relative to a nuisance in your village, * * * I have asked the attention of the president of the village to the subject, because this is a subject on which action by the whole board is required."

April 2, Dr. Jones wrote to the Secretary stating that the nuisance had been investigated by the local board and abated.

Stock-yard in Buchanan Village, an Alleged Nuisance.

May 12, 1896, Dr. H. M. Brodrick, health officer of Buchanan village, Berrien county, wrote to the Secretary of this Board as follows:—

"We have a stock-yard in our town that has been and is a source of great annoyance to the people living in the vicinity, from the horrible stench arising therefrom.

"At the beginning of this municipal year, a numerously-signed petition was presented by the taxpayers in the vicinity of the stock-yard to the council, praying for an investigation and condemnation of the same. The council referred it to me as health officer. I reported it a nuisance and detrimental to health, when it was referred to the attorney to take action upon. He is slow, and has done nothing as yet, and the petitioners are getting uneasy, and at their request I write you.

"Has the State Board any jurisdiction in this matter? Do they ever send any member to investigate such matters? What does it cost to get one to come and investigate? Who pays them? Does the State pay them salaries, and are they obliged to attend to calls upon them in such matters?"

"The prevailing winds are from the southwest and west, and after a shower in the quiet of the evening, or early in the morning the stench is so horrible that the people are obliged to keep the doors and windows of their houses closed, and then they are not free from it. If our attorney does not move in the matter can your Board do anything?"

In reply to Dr. Brodrick's letter, May 13, the Secretary wrote:—

"Your letter of May 12, relative to the alleged nuisance in the village of Buchanan, is before me. I should think from your letter that there is no question regarding the dangerous nature of the nuisance, let alone its offensive nature to the inhabitants; I think this subject should receive immediate attention and be abated as the law requires. The local board of health has full jurisdiction. This Board has no jurisdiction except in an advisory way; it has no compulsory or mandatory power. Members of this Board, singly and collectively, have investigated and advised relative to nuisances, although there is no law requiring that they do so. Except myself, no member of this Board receives a salary; no member receives compensation for his public health services. If a member, or members, of this Board, should go to Buchanan, it would probably be necessary for the village of Buchanan to pay railroad, hotel and other actual expenses; there will be no cost for time of member or members.

"The local board of health should force action and abatement of the nuisance caused by the stock-yards."

Hog-yard in Pittsford Township, an Alleged Nuisance.

In June, 1896, a petition signed by eight residents of Pittsford township, Hillsdale county, was received at this office. Said petition set forth that a hog-yard run in connection with a cheese factory was, by reason of foul odors and unhealthful conditions, a nuisance; and request was made that the same be abated.

June 16, the usual letter of advice was sent to the president of the local board of health, and his attention asked to the subject. Copy of section 1678 Howell's Statutes, which treats of the assignment of places for the exercise of offensive trades, was also sent to him.

Hog-pen in Tekonsha Village, an Alleged Nuisance.

June 16, 1896, a resident of Tekonsha village, Calhoun county, complained to this office of foul odors arising from a hog-pen in close proximity to his residence.

The complainant was informed that he should place the matter before the local board of health whose duty it is to investigate such cases.

Cow-pen in Otter Lake Village, an Alleged Nuisance.

Aug. 21, 1896, Dr. L. W. Pease, health officer of Otter Lake village, Lapeer county, wrote to the Secretary of this Board stating that "A woman keeps a number of cows in a very small pen facing a much used street, making the neighborhood almost unbearable on account of the odors. She has been notified many times that the nuisance must be abated. * * * She promised to move them if the town would build her a pen elsewhere. This was done, but she will not move the cows. * * * Please notify me how to proceed."

In reply to Dr. Pease's letter the Secretary wrote calling his attention to section 1640 Howell's Statutes, which makes it the duty of the local board of health to examine into all nuisances, etc., and to remove or prevent the same; and pointing out to Dr. Pease that being on the ground he could collect the facts and present them to the local board of health better than it could be done from this office.

ALLEGED OVERCROWDED SCHOOL-ROOM IN STRONACH TOWNSHIP.

March 2, 1896, a resident of Stronach township, Manistee county, wrote to the Secretary of this Board as follows:—

"On 19th instant the schoolhouse here burnt down, and the school board have opened school for the younger children in a room formerly used for a saloon. * * * There is a family of seven lives in the rear of this room and there has been more or less sickness there during the last year. * * * I think there has been no contagious disease. The enrolment in this room is fifty and attendance of over forty. The room is 21 by 22 feet and heated by a stove.

"Now I do not consider this place healthy, and I am afraid that disease will breed there. * * * I think there is no doubt but that many of the little ones will be sick in some way if they go there,—either from draft or from lack of ventilation, besides there is a very strong and disagreeable odor that permeates the whole room and does not depart when the room is aired. I have spoken to the health officer here and he seems to think it is all right. I desire to know now, where to apply for aid in determining whether or not the sanitary conditions are such that the school ought to be closed or kept open. * * * All I desire is that competent parties may pass upon this.

"The exit from the building where they are having the higher room or grades is also very unsafe for children. It is from 2nd floor and is open stairway, out doors, and narrow stairs. I think this a case where State Board of Health ought to take action."

March 3, 1896, the Secretary, by letter, informed the president of the local board of health of the complaint made, and expressed opinion that if conditions were as described, they constitute a nuisance which should be abated.

March 9, 1896, in reply to the Secretary's letter, Nicholas C. Welbes, president of the local board of health, wrote:—

"I have called a meeting of the local board of health of the township and it was resolved to engage two prominent physicians to investigate the matter. Enclosed find their report."

The report above referred to was substantially as follows:—

"We find that the former room is correctly reported as to size; that the pupils occupying it are of the age usually found in the primary department, under twelve years, and can comfortably sit upon the closely grouped desks provided; that the seats are of modern pattern of double seats, 22 in number, and that they are nowhere occupied by more than two pupils. The room is a well lighted, cleanly schoolroom with a ceiling 11½ feet high, and when we visited it, with the children present, the air was pure and wholesome. The fact that the room had at one time been used as a saloon has, in our opinion, no bearing on the case. It is a clean, tidy school-room, too small for the 40 pupils on the rolls, heated by a stove which occupies a place in the center, and doubtless on a cold day makes those who must necessarily sit near it too warm if those more remote are warm enough. Nevertheless it is a much better school-room than usually seen in country districts. The family living in the back are not suffering and never have suffered from contagious disease. * * * The privies are rough board earth closets that will become unsanitary in warm weather. They are not so now. The locality is healthy. Altogether we consider that the school-house is in no sense a menace to the public health. The room occupied by the upper classes is of good size, well lighted, furnished with new modern single desks and seats 45 pupils; forty pupils are in attendance. The youngest in that room is nine years. The outside stairs are well railed on both sides, and as the youngest child in that room is nine years of age, are in no sense dangerous or unsafe. Altogether we consider the school board of Stronach is entitled to great credit for providing so well for the pupils in an emergency."

SHALLOW GRAVES IN PINE RIDGE CEMETERY.

The "Detroit Evening News" of March 13, 1896, contained the following item:—

"Bay City, Mich., March 13.—A shocking state of affairs has been revealed in the Pine Ridge cemetery, commonly known as the Birney cemetery. The News directed the attention of the officials to the matter Wednesday afternoon. Officer Wyman obtained a pavement probe, a sharpened iron rod, and, accompanied by Dr. Kerr and The News, went to the cemetery. The newly-made graves were the object of immediate attention.

"Near the rear of the cemetery, along the road leading to the right after entering the main gate, a person was buried only a few days ago. The probe convinced the party that the top of the outside box was on a level with the ground. Bunches of sod and dirt formed an embankment. The mound generally made over a grave indicated that special care had been taken to give the grave an appearance of repose.

"Other graves were subjected to the same test. As many as five of the late ones were so shallow that the outside box came within two feet from the surface. Some were of the proper depth. In the majority of cases, however, the depth to the top of the box was about two feet. In the Hebrew burying ground, located in the rear of Pine Ridge cemetery, the shallowness of one newly-made grave was clearly revealed.

"Dr. Kerr and Officer Wyman were convinced beyond a reason of doubt that the manner in which many of the dead were buried was outrageous. The other cemeteries will be given a thorough investigation. It will not be surprising to find the graves dug in the winter in about the same state as in the Pine Ridge cemetery.

"Prosecuting Attorney Gilbert was notified of the discovery and will act in conjunction with the board of health. The law provides that the board has the power to investigate and abate nuisances. It needs no argument to convince the public that the condition of affairs mentioned above is detrimental to health. In addition to this, the people who have their relatives or friends buried in such a loose manner cannot refrain from becoming indignant. Ghouls would have an easy task to carry away the remains of a mortal buried close to the surface.

"Evidently it is a difficult task to dig a grave in cold weather. The ground is hard for several feet down. Still this ought not to stand in the way of burying a body at least five feet under ground. Infants should be placed at least three and one-half below the surface.

"It is believed that a state law provides that graves should be of a certain depth. Sexton Fisher bears an excellent reputation. It will be learned later whether or not he is cognizant of the condition of certain graves. It is said that in one instance a black cloth was laid over the mouth of the grave to prevent the mourners or friends from seeing the depth of the grave."

May 11, 1896, the Secretary of this Board wrote to Dr. William Kerr, health officer of Bay City, as follows:—

"Along in March you were taking some action regarding the shallowness of the graves in Pine Ridge Cemetery. I believe your board dealt with the subject as a nuisance."

"Will you kindly inform me what was done with this subject?"

In reply to the Secretary's letter, May 13, 1896, Dr. Kerr wrote:—

"Yours of the 11th received, and in reply would say that I was present at the examination of certain graves in cemetery in question and saw that they were not deep enough. There was but one, however, that was very near the surface, and that was on the side of a rise in the ground which will be leveled up and there will then be about three feet of earth covering the coffin. I saw the superintendent of the cemetery and he said it was due to carelessness on the part of the grave digger, who knew that more earth would soon be placed above the sand in the leveling process. Mr. Fisher, the superintendent told me that he was now very careful about the matter and it should not happen again."

FILTHY CONDITION OF A JAIL, AN ALLEGED NUISANCE.

By letter dated Aug. 26, 1896, the village marshal of Oakley village, Saginaw county, informed this office that the room used as a jail in that village was in a very filthy, unsanitary condition; and that the village council declined to have it renovated.

Aug. 27, 1896, the Secretary, by letter, advised the president of the local board of health of the complaint made, and at the same time wrote to the village marshal informing him that "this is a subject which comes under the jurisdiction of the local board of health."

OVERFLOWED LANDS.

Dam in river, an alleged nuisance.

S. E. Hopkins, clerk of Green Lake township, Grand Traverse county, informed this office that a dam in the river near the south end of Green Lake, in Grant township, by causing the water in the lake to overflow low lands north of the lake, in Green Lake township, was a nuisance; and wanted to know which of the two townships (Grant or Green Lake) had authority to abate the nuisance.

Nov. 17, 1896, in reply to Mr. Hopkins' letter, the Secretary wrote:—

"It would seem to me that this is a case where there is *not* a 'plain adequate and complete remedy at law.' I presume your way is to make application to the circuit judge, under §765 Howell's Statutes."

*It was so reported in the Detroit Evening News of Mar. 13, 1896.

Mill Dam in Hillsdale city, an Alleged Nuisance.

On pages 348-350 of the Annual Report of this Board for 1893 and pages 457-460 of the Annual Report for 1896 are given details of the nature of this alleged nuisance, and of the action taken in regard to it by the parties concerned. The following correspondence continues the history of this subject up to the dates therein mentioned:—

Aug. 5, 1896, Andrew L. Davis, supervisor of Jefferson township, Hillsdale county, wrote to the Secretary of this Board as follows:—

"I have had some correspondence with your Board in relation to a certain alleged nuisance in our township (Jefferson) on account of the water flowing out from Lake Pleasant on the marsh and then backing up onto the swamp and low lands, and flooding our low lands and highways as well. A certain miller in Hillsdale city claims the right of the water for his mill, and an injunction was issued in an early day restraining the draining of the marsh on account of this mill, which was a water mill but since changed to a steam mill.

"We were forced by the exigencies in the case to cut a ditch through the bank and let the water off in 1893, since which time we have been entirely free from the nuisance complained of. The miller then sued the township for \$10,000 damages, and a decree to shut up the drain.

"The circuit court makes a decree that the miller shall have *six cents* damages but the drain must be closed up, which will bring us back to the same condition of things as when I wrote you before, and sent you the map of the surrounding country. Now, whether our proper way is to carry it to the court above or begin with the board of health is a question I would be glad to receive your advice in relation to.

"Should we be forced to commence again with the board of health of our Tp. we shall ask you or your board to meet with us if possible, and view the condition of things, and help to decide whether the flooding of 800 or 1,000 acres of land with no earthly chance of drainage is a public nuisance or not.

"The court admitted that the stoppage of the ditch would necessarily overflow the land and made the decree to take effect on Nov. 1st, 1896, thereby giving the residents time to secure their crops as he knew they could not do, should the outlet to the lake be closed up at once.

"Now, gentlemen, as your business calls you to deal more or less with Public Nuisances and are familiar with the supreme court decisions in such cases, we would think it a favor to receive your opinion in the matter as to our best course.

"I enclose postage for five or six of your pamphlets, containing the map I sent you."

In reply to Mr. Davis' letter, Aug. 7, 1896, the Secretary wrote:—

"Your letter of Aug. 5, is before me. But I do not think it contains facts enough to enable me to give advice. I do not know on what ground you could appeal from the decision of the circuit court, nor whether the decision was by the court or by a jury. I think your Board of Health would do well to ask the advice of the Prosecuting Attorney of your county, and place before him all the facts and details relating to the subject."

Aug. 10, Mr. Davis again wrote:—

"I continue to write you in relation to the matter of the ditch from Lake Pleasant as our townsmen, like myself, believe you are better posted in the Supreme Court decisions as far as relates to nuisances than any lawyer that does not make that a specialty, can be. I will say that this ditch was not opened by any order of the board of health, as our physician supposed that he would have to swear, if any contest came out of it, that there was much sickness in the vicinity and *that* was the probable cause.

"But the circumstances became so unbearable and intolerable, the citizens donated their time and cut through the bank, five or six rods, and drained the marsh and lowered the lake. The suit was tried on the 14th. of July, by the court in chancery, and while he admitted the equities of the matter, he decided on the question of turning what he termed a regular water course. The court admitted that in rendering his decree that the water would have to pond on from one hundred to two hundred acres to the depth of from 2 to 3½ feet before it would run back over the rise in the marsh, and make its way toward the city. We demur about his throwing out all equity in the case and making the decision on the matter of water way alone. His counsel declared in his plea, after admitting that the proof sustained the point that from 800 to 1,000 acres of land was flooded some parts of the year and rendered the land of little or no value, that the law would give Mr. Stock the right to flood that land, whether it was any value to him or not. Some of this land is seven miles from the mill, which used no water except for steam.

"Our defense was made on the grounds that the flooding of the lands and highways was a public nuisance, and should be abated and believed the matter of equity would truly be our right to drain the marsh the way we did, as we had 3½ feet fall in 120 rods and only 1 and 54/100 feet fall the other way in a mile or more and claimed and proved that such drain could not be made practical. Of course we have until the first day of November to close the ditch, after which time we shall have on our hands the same old curse that we have endured so many years, and must rid the township of it in some way, therefore you will readily excuse our persistence in asking your advice. The case is in the hands of the prosecuting attorney and tried the case in July last, and I think was very much disappointed at the decision of the court, as every one else was who listened to the evidence. The question arises, in our consideration over the matter, whether the

Supreme Court has equity jurisdiction in such cases or whether they, like our court, bind themselves down to the cold facts of the law.

"We would be pleased for your opinion of the matter from the surface view you have of the case and whether it would be safer to allow the land to flood and the road to become impassable or dangerous and condemn the land under a decision of boards of health, or trust to the higher court taking equity jurisdiction in the matter."

Aug. 15, 1896, the Secretary replied to Mr. Davis' last letter, as follows:—

"Your letter of August 10, relative to an alleged nuisance is before me. I understand from your letter that you did not proceed as I advised you to do, that is for your local board of health to order the abatement of the nuisance. Section 1640 Howell's Statutes requires the local board of health to examine into all nuisances, sources of filth and causes of sickness, which may in their opinion, be injurious to the health of the inhabitants, and destroy, remove or prevent the same as the case may require, and when there is not a plain, adequate and complete remedy at law, section 7965 Howell's Statutes gives the circuit court equity jurisdiction, and authorizes the court to grant injunctions to stay or prevent nuisances. My judgment is that you should have proceeded as I advised you, and if your local board of health could establish the fact that *there was a nuisance* and that you had *not* a plain, adequate and complete remedy at law, then you should have applied to the circuit judge, who is given, by section 7965 Howell's Statutes, equity jurisdiction, and the judge might then have granted an injunction to stay or prevent the nuisance, but if he had refused you could then have appealed to the Supreme Court.

"You do not state under what section of law the suit was brought to compel you to close the ditch. However, judging from your letter, I presume that you could appeal to the Supreme Court, alleging that the Circuit Judge erred in setting aside all equity in the case and deciding upon the law alone, but as to whether the Supreme Court would reverse the decision, or decide the same as the lower court, I am unable to form an opinion.

"If your local board of health should proceed as I advised you—under section 1640 Howell's Statutes, in case that you could not prove there is any nuisance, you could then apply to the County Drain Commissioner, under the drain law, who would cause a citation to issue for a hearing before the Probate Judge, who would appoint commissioners to determine whether the drain is a necessity or not.

"I am not a lawyer, and it seems to me that good legal counsel is needed in this case."

Flooded land in Gilmore Township, an alleged nuisance.

Sept. 15, 1896, Geo. D. McCollum, M. D., health officer of Gilmore township, Isabella county, wrote to the Secretary of this Board stating that 400 or 500 acres of low land adjacent to a small lake, had been repeatedly flooded during the summer, and had become a nuisance by reason of malarial emanations therefrom, which were believed to cause sickness; and for information relative to the measures necessary to effect the abatement of the nuisance.

Sept. 18, 1896, the Secretary sent Dr. McCollum documents containing the information asked for; and at the same time wrote to the president of the local board of health advising him of the conditions described, and asking attention to the subject.

Oct. 9, in reply to the Secretary's letter, the president wrote substantially as follows:—

"I have investigated the best I could. I don't find any sickness around the lake. People living around the lake say Mr. Weideman has paid them for the privilege of flooding, and they are willing he should flood."

INSUFFICIENTLY BURIED CORPSE, AN ALLEGED NUISANCE.

April 28, 1896, a resident of Sumpter township, Wayne county, wrote to the Secretary of this Board substantially as follows:—

"Shedric Dunbar was buried some 11 or 12 years ago. He was buried not over six inches deep, and neighbors said they could smell him as he decayed. The corpse was buried on my premises. I notified the township board to move it. They tell me they don't want to act without orders from the State Board of Health. Please notify them. The people at large consider it a nuisance."

In reply to the above quoted letter the Secretary wrote:—

"There is not enough information before me to understand the situation, and I should recommend that you place the subject before the supervisor of the township who is president of the local board of health. This is a subject which should be placed before the local board of health it having jurisdiction.

"If, as I infer from your letter, the body has been buried 11 or 12 years, I do not see how it can still be a nuisance, so far as any odor is concerned."

FERTILIZER FACTORY, AN ALLEGED NUISANCE.

April 28, 1896, Thomas Tanner, M. D., health officer of Carrollton village, Saginaw county, wrote to the Secretary of this Board to the effect that a factory situated on the east side of Saginaw River, just opposite Carrollton village and within the limits of East Saginaw, where all the dead animals from the city are "cooked in some manner in order to make some kind of fertilizer," and that when the wind blows towards the village the odor from the factory is very offensive and likely to cause outbreaks of disease. Dr. Tanner further wrote:—

"The establishment not being in the village, but within the limits of East Saginaw, I do not know how to abate it. I write to ask you what are the proper steps to take to have it stopped. Also if the fact that they have spent money on buildings, etc., is any reason that they should still continue as they are. I think we can prove that it is a nuisance, also dangerous to public health."

April 30, 1896, the Secretary wrote as follows to Dr. Tanner:—

"Replying to your letter of April 28, relative to an alleged nuisance * * * .

"If the local board of health of the city of East Saginaw will not act, your best way would be to apply to the courts, probably first to the prosecuting attorney. You should make formal complaint to the board of health of East Saginaw. I will write to the president of the East Saginaw board of health, and call his attention to your complaint.

"Section 1678 Howell's Statutes requires the mayor and aldermen of every city, from time to time to assign places for exercising of any trade or employment offensive to the inhabitants or dangerous to the public health, and forbid the exercise thereof in places not so assigned."

On the same date (April 30, 1896) the Secretary wrote to the mayor of East Saginaw informing him of Dr. Tanner's complaint, and calling his attention to the law relative to this subject as contained in section 1678 Howell's Statutes.

WASTE WASH FROM A BUTTER FACTORY, AN ALLEGED NUISANCE.

May 11, 1896, a resident of Vermontville village, Eaton county, wrote to this Board stating that, from lack of proper drainage, the waste wash from a butter factory in that village was allowed to remain on top of the ground near the highway, that the odor from it had become sickening, and that in his opinion sickness would result if the nuisance were not abated.

May 11, 1896, the Secretary of this Board wrote to the president of the board of health of Vermontville advising him of the conditions described, and calling his attention to section 1678 Howell's Statutes, of which a copy was sent him.

The president replied to the Secretary's letter as follows:—

"I am in receipt of your communication of May 11, and in reply say that I have made a thorough examination of butter factory and premises and find it properly drained, and no more odor arising from it than is usual at Butter or Cheese factories."

LOG JAM IN CHIPPEWA RIVER, AN ALLEGED NUISANCE.

May 13, 1896, E. R. Ferguson, health officer of Sherman township, Isabella county, wrote to the Secretary of this Board, for advice, as follows:—

"Will you please give me information on the following question, as I have just been appointed health officer for the township and have had no experience in the business. The Gale Lumber Co. have been driving logs in the Chippewa River, and have left a jam of logs nearly a mile in length in the river, said logs to remain as they, the Co., say all summer. Complaint was made to me that the logs lying in the water were injurious to the health of the people. I went and investigated the matter the best I could and found the logs, a portion of them partially decayed, and a very bad smell arising from them; and it seems to me that they must be injurious to the health of the people; and as I have no instructions to go by, will you please inform me what to do; for if I do anything I would like to go at it in the right way."

In reply to Mr. Ferguson's letter, May 14, 1896, the Secretary wrote:—

"The health officer has no mandatory jurisdiction. His duty is to advise the local board of health on such subjects as nuisances. Before advising your board, I would recommend that you study carefully to learn just *what disease* would be likely to be caused by the logs in the river, and just *how* that disease is likely to be caused, such as by drinking the water, etc."

SAWDUST AND OTHER REFUSE THROWN INTO LAKES AND RIVERS.

Sawdust dumped in Pine Lake and Boyne River, an alleged nuisance.

May 27, 1896, Alfred J. De Lacy, M. D., health officer of Boyne City village, wrote to Secretary Baker, relative to this alleged nuisance, as follows:—

"Please notify H. White and Co. of Boyne City, to stop dumping saw-dust and refuse wood and debris from lumber yards into Pine lake and Boyne river. The firm of White and Co. have been notified repeatedly and refuse to comply, and the Council and board thought perhaps a notice from you as coming from the State Board of Health, might have the desired effect, and save the village a law suit."

June 1, 1896, the Secretary replied to Dr. De Lacy's letter as follows:—

"Replying to your letter of May 29, I send you herewith a copy of the pamphlet 'work of health officers' in which I have marked parts bearing on the subject. This alleged nuisance should be reported to the local board of health whose duty it is by law to investigate, and if a nuisance is really found to exist, to *destroy, remove or prevent* as the case may be. The local board of health have jurisdiction."

OLD POTATOES THROWN INTO BASS LAKE.

Aug. 3, 1896, G. S. Townsend, M. D., health officer of Belvedere township, Montcalm county, wrote to the Secretary of this Board as follows:—

"There has been complaint entered at this office in regard to parties dumping old potatoes into one of the little inland lakes of our township, known as Bass Lake. It is a small body of water perhaps of about 60 acres. No visible outlet or inlet. The water of this lake is used by the people adjacent to it for family purposes and for stock, etc. It also abounds in fish. Now then what are the consequences and procedures in a matter of this kind?"

In reply to Dr. Townsend's letter his attention was called to sections 1640 and 7965 Howell's Statutes, and pamphlet publications of this Board containing the information asked for, were sent to him. At the same time the attention of the president of the township board of health was called to the subject.

Later Dr. Townsend informed the Secretary that the nuisance had been abated.

UNWHOLESOME MEAT.

W. C. Hontz, M. D., health officer of Leonidas township, St. Joseph county, wrote to the Secretary of this Board, June 15, 1896, as follows:—

"A certain butcher shop within my jurisdiction as health officer, has always from time to time, put out unwholesome meat; but of late the shop has especially been made odious by putting out meat in which one specimen contained hundreds of maggots—made apparent upon heating. Of course, no meat was sold this bad, with their knowledge. They sell a great deal of meat that people justifiably don't want to eat.

"Now to the point. What are the ordinary tests for spoiled meat? What conditions of meat does the State Board of Health, or the courts recognize as unhealthy? The only way we judge is: (1) By the smell. (2) Frequently it is mouldy. I have been supposing all along that a mold may come on good meat—only needs washing off. If you will briefly state how I can recognize bad meat, or send me literature for the same purpose, I will be obliged to you."

June 16, 1896, in reply to Dr. Hontz, the Secretary wrote:—

"Replying to your letter of June 15, relative to an alleged nuisance in Leonidas, where there is a butcher who sells spoiled meat,—I should think that when meat had a bad odor, and if fresh meat was mouldy, it was unfit for food. However, this is a subject on which this Board has never taken action. I would suggest that your local board of health, under sections 1636 and 1639, frame and publish rules which shall govern the sale of meat in your township. Section 9316 Howell's Statutes provides imprisonment or fine for any person who knowingly sells any kind of diseased, corrupted or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer."

"You should bring the subject to the attention of your local board of health; it is required by law to act in such cases."

MILL PONDS, ALLEGED NUISANCES.

Mill pond in Battle Creek.

Two residents of Battle Creek complained to the Secretary of this Board that a certain mill pond in that city, which occasionally dried up, was, at such times, a nuisance by reason of malarial emanations therefrom.

The Secretary, by letter, explained to the complainants that the local board of health has jurisdiction in such cases, and that application for abatement should be made to said board.

VETERINARY PRACTICE, AN ALLEGED NUISANCE.

Aug. 13, 1896, Robert Walker, health officer of Olive township, Huron county, wrote to the Secretary of this Board as follows:—

"In our village which is called Elkton, we have a veterinary who has any amount of work, and he is located in the center of the village which is not incorporated. The people complain about the horses, etc., smelling, and are afraid. What am I to do in this matter? Should he be allowed to doctor horses in such a place?

In reply to Mr. Walker's letter the Secretary wrote:—

"If the place is considered a nuisance then your local board of health would have jurisdiction and could order the nuisance abated."

POMACE FROM CIDER MILLS.

Pomace in Buchanan village, an alleged nuisance.

Aug. 28, 1896, H. M. Brodrick, M. D., health officer of Buchanan village, wrote to the Secretary of this Board stating that a pile of 20 or 30

loads of pomace from a cider mill located in said village, had been allowed to accumulate within 3 or 4 rods of dwelling houses and by reason of foul odors had become very offensive. Dr. Brodrick further stated that the owner of the mill refused to remove said pomace, and continuing wrote:—

"I enclose a copy of the ordinance of the village covering this matter and by reading it you will see it does not cover this case, at least so it does not seem to me. * * * I write you for the purpose of asking what you would advise in the matter? * * * Please advise me fully as to the best course to pursue, and if you have any laws in pamphlet form please send me a copy. * * * The ordinances will be amended tonight, but will not take effect until Sept. 18th."

Aug. 31, 1896, replying to Dr. Brodrick's letter, the Secretary wrote:—

"This alleged nuisance should have the prompt attention of the local board of health. It would seem to me that 'Sec. 1' of 'Ordinance XXVII' covers this case, wherein it reads 'or other nuisance.' However, the general law applies to all nuisances."

Following is copy of Sec. 1, Ordinance xxvii, referred to above.

Sec. 1. If any person shall keep in or about any shop, warehouse or other building any green, untanned hides or skins, or shall carry on any filthy or loathsome trade, or shall erect or continue, or cause to be erected or continued, any privy, hog sty, cow pen, stable or other nuisance, he shall be punished by fine not exceeding ten dollars and costs of prosecution, for each and every day he shall continue to violate the provisions of this ordinance, after having received from the Board of Health, or any member thereof, twenty-four hours' notice to remove or abate the same."

Pomace in Lisbon village, an alleged nuisance.

Dec. 21, 1896, Karl Greiner, M. D., health officer of Lisbon village, Kent county, complained to the Secretary of this Board that the owner of a cider mill in said village spread large quantities of pomace on his land adjoining lots on which were residences, and that the occupants of those residences complained of offensive odors from said pomace. Dr. Greiner further complained that the owner of the mill had been notified to stop dumping the pomace on his land but refused to do so. Dr. Greiner asks "what shall be done" under the circumstances.

The Secretary, by letter dated Dec. 22, 1896, called Dr. Greiner's attention to sections 1640 and 7965 Howell's Statutes, which bear on the subject of nuisances. Copies of said sections, and publications of this Board bearing on this subject were sent to Dr. Greiner.

FILTHY CONDITION IN SAULT STE. MARIE.

Oct. 27, 1896, a resident of Sault Ste. Marie complained to the Secretary of this Board that the street on which he resided was, from various causes, in a filthy condition; and a source of sickness in his family. Said resident stated that complaints made to the local authorities relative to this nuisance were unheeded, and asked what he could do to obtain abatement of this alleged nuisance.

Oct. 30, 1896, replying, the Secretary wrote:—

"Replying to your letter of October 27, relative to the unsanitary condition of the city, this is a subject which should receive attention by the *local board of health*, and *not* the health officer. If the council is the board of health, and they *instructed the health officer* to act, then it is with the health officer. If you can get no satisfaction from either the board of health or the health officer acting for the board of health you might ask the advice of the prosecuting attorney of the county."

At the same time the Secretary wrote to the president of the local board of health advising him of the complaints made, and asking his attention to the subject.

ALLEGED UNSANITARY CONDITION OF HARBOR SPRINGS VILLAGE.

Sept. 4, 1896, a resident of Harbor Springs village wrote to this Board as follows:—

"The sanitary condition of our village is simply fearful. Complaints to the village health officer bring no response, and something should be done in the interest of the public health. 'Will you please take the necessary steps to force a general cleaning up, especially of outhouses and the alleys in the business portion of the village.'"

Sept. 5, 1896, the Secretary wrote to the president of the local board of health informing him of the complaint made.

Sept. 10 the president replied to the Secretary's letter as follows:—

"Replying to your communication of 9/5 relative to complaint of some one as to the filthy condition of our village. Permit me to say that while there might be cause for complaint on account of nuisances at times, yet the alleged statement 'that the village is in a filthy condition' is too broad a statement to be made without facts to sustain it, and might work injury to our village. We would like to know who your informant is and the particular nuisance referred to.

"We are anxious to have our village kept as clean as possible both for our own welfare and also that of the general public, and our local board of health has been prompt in suppressing all nuisances brought to their attention. We have had some difficulty in the matter of health officer, which is still unsettled and which has been a source of annoyance.

"By a majority vote of the village council one of their number was appointed health officer, contrary to the objection of myself as being illegal. He has done no work, as he became aware of the fact of his illegal appointment, yet claims pay and the council has failed to appoint some one in his place, although their attention has been called to the necessity of having a good active health officer.

"Please let me hear from you on the subject."

Sept. 12, the Secretary again wrote to the president of the local board of health as follows:—

"Please accept thanks for your letter of Sept. 10, relative to unsanitary condition of village, and relative to the health officer.

"The statement which reached this Office was 'The sanitary condition of our village is simply fearful. Will you please take the necessary steps to force a general cleaning up, especially of outhouses and the alleys in the business portion of the village.' I am glad to know that you wish to have the village in the best sanitary condition; I should think it necessary, being a summer resort. I hope your council will order a general cleaning up especially of outhouses and the alleys in the business portion of the village."

"If the village health officer is not doing his work, he should be removed and another appointed in his place. If there are any dangerous diseases there, he does not report to this office as the law requires. If you know of any cases of diphtheria, scarlet fever, typhoid fever, measles, whooping-cough, consumption, etc., I wish you would inform me so that I can secure a compliance with the law."

STAGNANT WATER, ALLEGED SOURCE OF NUISANCES.

Water in brick-yard in Owosso, an alleged nuisance.

Sept. 1, 1896, A. D. Goodwin, as chairman of a committee selected by the people of South Owosso, wrote to the Secretary of this Board:—

"There are two brickyards in our portion of the city. They are excavated from four to eight feet deep and contain from a few inches to perhaps two or three feet of stagnant water. We have petitioned our local board of health and also the city council * * * asking them to cause the yards to be filled and drained according to chapter fourteen of the city charter; but all our prayers have been ignored. Will you please take action in this matter if in your power."

Sept. 2, 1896, the Secretary wrote to the mayor of Owosso, for the president of the local board of health, informing him of the complaint made, and asking the attention of the local board to the subject.

Sept. 8, 1896, in response to the Secretary's letter, Ira G. Curry, mayor of the city, wrote:—

"Replying to yours of 2nd inst. regarding alleged nuisance in South Owosso, would say that the matter has been before the Board of Health, the Board of Public Works and the Committee on nuisances of the Council and I enclose their report, which is that they cannot find anything detrimental to health in that locality; that although there is some water in those yards it is not stagnant water. These yards, to be sure, are an eyesore to these people and they would like to get them out; but the owners of them had settled there years before the people built their homes about them and knew the yards were there when they built."

Stagnant water in Cassopolis village, an alleged nuisance.

Sept. 13, 1896, a resident of Cassopolis wrote to the Secretary of this Board as follows relative to an alleged nuisance in that village:—

"I write asking information. There is a mud hole or pond of stagnant water in front of my property most of the time. The water from several streets washes the manure and refuse all down in front of my house. The pool scums over. The water runs over the side walk, when it rains, into my lot. This is on no back street, but within one block of main street. There is no question about its unsanitary condition, and it also is a damage to me financially. Our health officer says it is and every body knows it. * * * I have recently filled up part of the lot and built a house and am living in it, and it is not right to endanger the health of my wife and baby just because the board and a few influential citizens desire it. * * * Is there any way I can commence suit against the village? I have plenty of witnesses, etc. How shall I proceed, sue for damages or what?"

Sept. 15, 1896, the Secretary, by letter, called the complainant's attention to sections 1640 and 7965, Howell's Statutes, which contain the information asked for, and of which copies were sent to him.

On the same date the Secretary, by letter, referred the complaint to the president of the local board of health of the village, and called his attention to the sections of law above mentioned and others bearing on the subject of nuisances, contained in pamphlet publications of this Board, which were sent to him.

Stagnant water in Merrill village, an alleged nuisance.

Sept. 16, 1896, a resident of Merrill village, Saginaw county, complained to the Secretary of this Board that stagnant water in several places on the highway running east and north from the village created a nuisance and was a menace to the public health.

The Secretary submitted the complaint to the president of the village in the usual way and invited the attention of that official to the subject.

Water in cellars in Lansing, an alleged nuisance.

Sept. 30, 1896, two residents of Lansing city complained to the Secretary of this Board that water in their cellars to the depth of six to twelve inches was injurious to the health of their families, and that there being no sewer in their neighborhood, they were unable to drain the water from their cellars. The object of the complainants seemed to be the construction of a sewer on their street so that they could drain their cellars.

The Secretary referred the subject to the president of the local board of health with request that the necessary attention be given to it.

Mill pond in Greenwood township, an alleged nuisance.

Oct. 13, 1896, a resident of Greenwood township, St. Clair county, complained to this office that a pond of stagnant water at a flax mill within eight rods of his residence was, by reason of malarial emanations, cause of his wife's sickness and therefore a nuisance.

Oct. 15, the Secretary, by letter, advised the president of the township board of health of the complaint made and requested that the subject receive the attention of the local board of health.

Oct. 19, in reply to the Secretary's letter, the president of the local board of health wrote that the board had investigated relative to this

alleged nuisance, and found that no conditions likely to cause sickness existed at the pond in question, and that the probable cause of the illness of complainant's wife was the filthy state of his own premises.

Alleged unsanitary condition of Delray.

In December, 1896, petitions signed by residents of Delray and vicinity, Springwells township, Wayne county, were sent to Governor Rich, setting forth that the water supply of the said locality was believed to be contaminated and the cause of sickness from diphtheria and typhoid fever; and requesting that the Governor instruct the State Board of Health to investigate the subject.

The Governor referred the complaints to the Secretary of this Board who, in compliance with the request of the petitioners, personally investigated the sanitary condition of the locality in question, and later reported thereon to the Governor.

A copy of the Secretary's report is printed in the article on typhoid fever, on pages 316-17 of this Annual Report.

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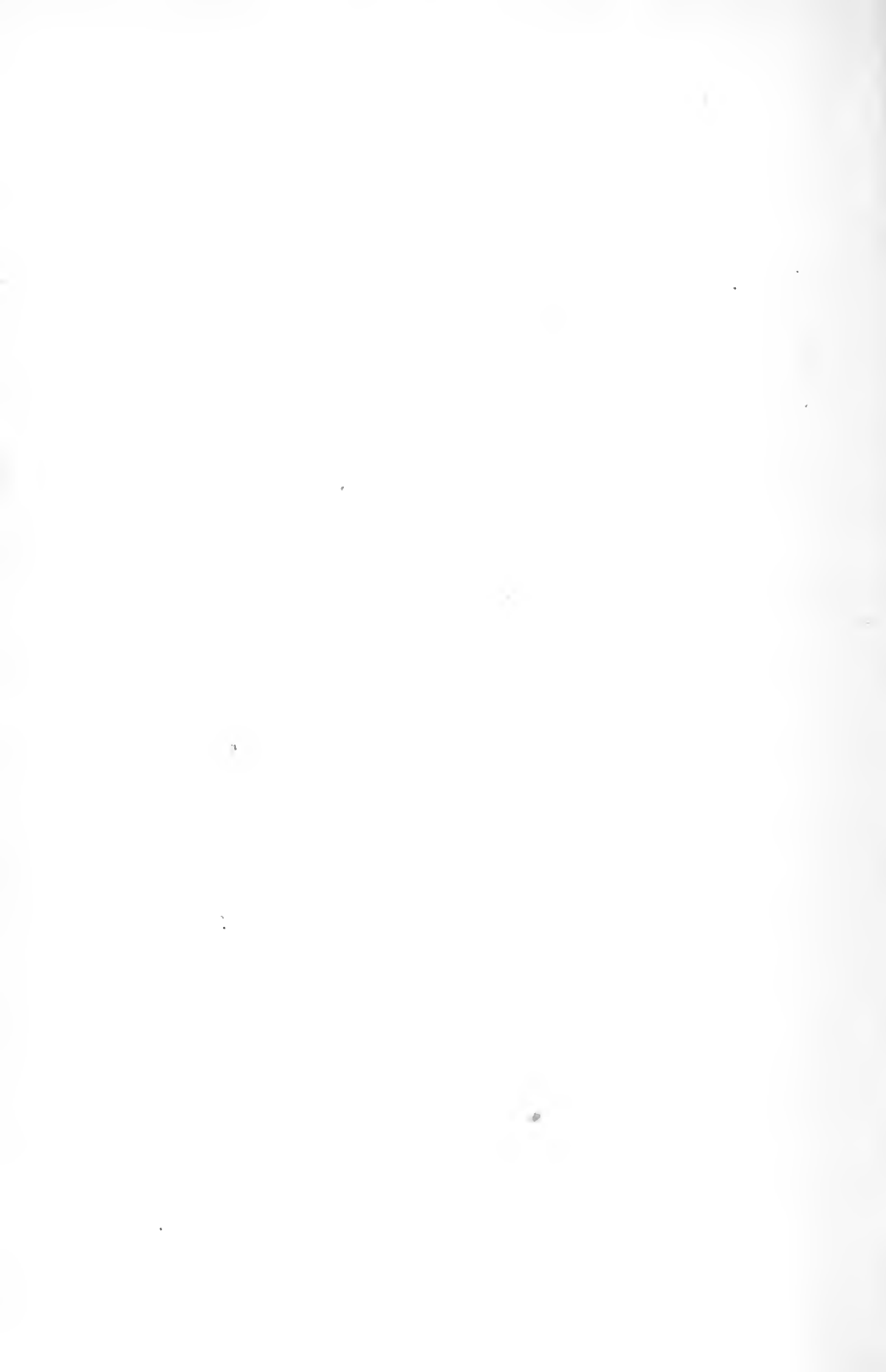
- Page 78.—In the second line of heading to Exhibit 38, the words "monthly averages for 1894" should read "monthly averages for 1895."
- Page 177.—In the first line of heading to Table 10, after the words "Table 10" the word "Diphtheria" should be inserted.
- Page 186.—In the second line of heading to Table 19 the words "during the year 1896" should read "during the years and each of the years 1893-96."
- Page 253.—In the twentieth line the words "scarlet fever" should read "measles."
- Page 229.—In the second line of heading to Table 17 the words "during the year 1896" should read "during the years and each of the years 1893-96."
- Page 326.—In the first line of heading to Table 9, after the words "Table 9," the words "Typhoid fever" should be inserted.

A QUARTER-CENTURY OF PUBLIC-HEALTH LITERATURE
IN MICHIGAN:

AN INDEX OF THE PRINCIPAL SUBJECTS IN THE PUBLICATIONS OF THE
MICHIGAN STATE BOARD OF HEALTH, FROM ITS ORGANIZATION IN
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[522.]



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INTRODUCTION.

In commemorating the twenty-fifth anniversary of the establishment of the Michigan State Board of Health, it is fitting that public attention be called to one of the most important duties required, by the Act establishing the Board, of its Secretary—the collection of information on the subject of Hygiene, and the dissemination, through Annual Reports, and otherwise as the Board may direct, of such information among the people. Twenty-five Annual Reports, thirty-eight supplementary reports, and about two hundred and fifty circulars and leaflets, have been prepared and published, and widely distributed throughout this State, and copies have been sent to prominent sanitarians and others in the principal cities of both hemispheres, in exchange for their publications.

The wide range of subjects treated in the publications of the Michigan Board will be seen by reference to the following index, but some of the more important subjects are here worthy of special mention. In keeping with the work to which the efforts of the State Board of Health have been mainly directed, a large proportion of the publications have reference to the causation, propagation, restriction, and prevention of the dangerous communicable diseases. From the reports received from the health officers of cities, villages, and townships throughout the State, has been prepared, and published in the Annual Reports of the Board for many years, a statistical study of the most important communicable diseases, having special reference to the sources and vitality of the contagium, the periods of incubation, duration of infectiousness and seasonal prevalence of, and influence of age in the sickness and deaths from such diseases, and the results of measures taken for their restriction. Very many valuable papers, bearing upon the subject of communicable diseases, have been read at the various Sanitary Conventions, and other meetings held under the auspices of the State Board of Health, and these have been

published in the Reports and Supplements, many of them separately in pamphlet form. The circulars and leaflets issued by the Board relate principally to the subjects beforenamed, and have appeared in the Annual Reports from time to time when first issued, and sometimes when a new edition has been published. As most of the circulars and leaflets have been revised from time to time, those in present use may differ considerably from the copy which first appeared in the Annual Reports.

Two very important subjects, and to which much time and labor have been devoted, are the prevalence, in Michigan, of each of twenty-eight important diseases, and the relation between such diseases and certain meteorological conditions. These subjects have been considered in the Annual Reports, and reprinted in pamphlet form, under the titles of "Weekly reports of diseases in Michigan," "The time of greatest prevalence of each disease," "Principal meteorological conditions in Michigan," and in an instructive paper on "Sickness Statistics," by Dr. Baker, Secretary of the Board. Four of the twenty-eight diseases have been separately treated by the Secretary of the Board in extensive papers, "Cerebro-spinal meningitis," "The causation of pneumonia," "The causation of influenza and allied diseases," and "The etiology and pathology of typhoid fever." The articles on meteorology are a complete record of observations made by a corps of observers in different parts of the State, for a period of twenty years, and the statistics of sickness include the observations of physicians in nearly every part of the State for a like period.

Other important subjects, respecting which many valuable papers have appeared in the publications of the Board, are the water-supply, sewerage, and disposal of waste of cities and villages; the heating and ventilation of buildings, public and private; and the sanitary condition of schools and school surroundings.

CLASSES OF PERSONS TO WHOM IT IS HOPED THIS INDEX WILL BE USEFUL.

To facilitate the work of those who make use of the publications of the Board for the purposes of reference and study, and to develop and foster an interest so that many more persons shall use the valuable information contained therein, the following index of the important subjects has been prepared. In it may be found facts and remarks on almost every phase of public-health work, and to those directly or indirectly engaged in this work, its usefulness will be great. It ought to prove useful: to officers and members of the State Board of Health, to the local boards of health and health officers, in the convenient reference to the many subjects relating to their powers, duties and responsibilities; to editors of newspapers and periodicals, in supplying convenient data on any public-health subject as it may arise; to municipal and sanitary engineers, in the subjects of water-supply, sewerage, drainage, disposal of waste and excreta, heating and ventilation, pavements, etc.; to the superintendents and teachers of schools, in the subjects of school hygiene, school-room diseases, school life in relation to vision, the sanitary condition of schools and their surroundings, school furniture, the teaching of hygiene and sanitary science in schools, etc.; to the superintendents and boards of control of State and public institutions, in the subjects of examination of State and county buildings, and the examination of plans for buildings, ventilation and sewerage at State institutions; to physicians and students of hygiene, in the many subjects which relate to the preservation of health; to the meteorologists, in the subjects of meteorological conditions in Michi-

gan, and the relations of meteorology to diseases; to chemists and bacteriologists, in the subjects of food and food supplies, milk and milk products, drugs, water and its impurities, etc.; to those who prepare papers for mothers' clubs, farmers' institutes and sanitary conventions.

These are but samples of the many classes of persons to whom the index will be a source of much labor-saving and time-saving, as may be seen by a perusal of the list of subjects.

At the right-hand margin of the page a star (*) is placed opposite every report, supplement, reprint, circular or leaflet which is not available for distribution. Circulars and leaflets are designated by the number or letter being placed in brackets [].

To facilitate the reference to subjects, an authors' index is appended to the index of subjects, the numbers following the authors' names in this index corresponding with the consecutive numbers preceding each subject in the subject index.

[NOTE.—SUGGESTIONS RELATIVE TO THE USE OF THIS INDEX, AND METHODS OF OBTAINING THE PUBLICATIONS SPECIFIED IN THE INDEX.

I believe that this index will be likely to be very useful for many years to come, to any person searching for any subject in public-health literature, or writing or studying any subject relating to almost any branch of sanitary science or public-health administration, and will enable such a person to ascertain immediately whether the Michigan State Board of Health has at any time during its existence published anything on the subject in question, and will show at a glance whether that publication is "out of print" or whether it can probably be secured by addressing the Secretary of the State Board of Health, Lansing, Michigan.

This Quarter-Century Index makes it possible for any person, who has it, to make the most complete use of any of the publications of the State Board of Health which may be in his possession, or which may be accessible in some near-by library, where may perhaps be found copies of publications now "out of print," not to be had from the office of the State Board.

The index shows in just which annual report, supplement, or other publication, mention of any special subject will be found. A set of the publications of the State Board of Health will probably be found and may be consulted in nearly every public library in Michigan, and many of the public libraries outside of Michigan. Outside of Michigan the publications will be most likely to be found in State libraries, libraries of other State Boards of Health, and libraries of local health departments. In Michigan many physicians and ex-health officers will have some of the publications, and might have just the publication desired.

HOW TO OBTAIN THE PUBLICATIONS.

Those who desire to make use of the publications of the Board, and who are not in possession of them and cannot get access to them at any public or private library, may obtain copies of such as are available for general distribution, upon application to the Secretary of the State Board of Health, Lansing, Mich. Frequently, that is, in almost every year, the small appropriations at the disposal of the State Board of Health are so nearly exhausted that it is not practicable for the office of the Board to pay the postage on even the current publications of the office. Therefore, to make sure of receiving the publications, it may be well for any person asking for them to enclose stamps for postage; for an annual report, about twenty or twenty-two cents; for a supplement, about three or five cents; for ordinary reprints, about one cent each. H. B. B. Sec. State Board of Health.]

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